Season's Greetings

# COMPUTERWORLD

THE NEWSWEEKLY FOR THE COMPUTER COMMUNITY

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NEWSPAPER

## *Datapro Finds Decline In '81 Software Outlays*

**By Lois Paul**
CW Staff

DELRAN, N.J. — Despite the increasing emphasis on the purchase of packages instead of on in-house software development, total expenditures for software packages declined between 1980 and 1981. However, an increase is anticipated in 1982 to slightly higher than 1980 levels.

This was the finding of Datapro Research Corp.'s ninth annual "User Ratings of Proprietary Software." The average dollar expenditure for software packages in 1981 was $98,568, as compared with $117,831. The figure predicted for 1982 is $130,157 (see chart below).

The survey results for 1981 continued the trend cited in 1980 of users opting for independently supplied software rather than adhering to computer vendor offerings. The survey indicated that 79.7% of the respondents use separately priced software with the computer vendor alone supplying software for 21% of the users. An additional 15.3% said they use only independently supplied software and 62% reported that they use software supplied both by independent vendors and by their hardware vendor.

*Complete charts of user ratings begin on Page 16.*

A total of 6,152 package ratings were made by the 3,902 respondents. Of these, 2,341 respondents rated one package; 1,208 respondents rated two packages and 353 respondents rated three or more packages.

The 417 individual packages from 159 different vendors were rated by three or more of the respondents. Each package was rated on a four-point scale (from poor to excellent) on reliability, efficiency, ease of installation, ease of use, vendor's technical support (troubleshooting, documentation and user education), vendor's maintenance and overall satisfaction.

The survey includes detailed package ratings for each of the 417 packages rated by three or more respondents. Nineteen packages were rated in the top cluster.

The surveyers included questions designed to determine the software package that comes first to mind for users; the package used most in the past year and the package the user is most likely to buy next.

| | 1980 | 1981 | 1982 |
|---|---|---|---|
| **Number Reporting Expenditure** | 2,337 | 2,596 | 2,126 |
| **Percent Reporting Expenditure** | 59.9 | 66.5 | 54.5 |
| **Total Dollar Expenditure** | $275,372,000 | $255,883,000 | $276,714,000 |
| **Average Dollar Expenditure** | $117,831 | $98,568 | $130,157 |
| **Median Expenditure** | $20,000 | $20,000 | $25,000 |

Source: Datapro Research Corp.

# DP Christmas Crunch Starts

## *• Code Stymies Air Fare Info*

**By Marcia Blumenthal**
CW Staff

The coming holiday season may be one of the few times of the year that travelers will not be confused about airline fares. There are no bargains right now.

But during the rest of the year, if you want to visit Duluth, Minn., and you fly between Tuesday and Thursday at noon while wearing black shoes, you may be able to save a bundle.

The only problem will be finding out the exact fare because the airline fare quotation software systems currently in use were not designed to operate in a competitive industry environment in which there is a myriad of rapidly changing fare structures. Deregulation of the airline industry has created havoc in these systems as airlines increasingly compete to offer travelers ever more exotic fare packages.

Although the airlines and vendors of airline software systems are working to overcome the overload in the current systems, really good solutions are at least a year or

*(Continued on Page 6)*

## *• Amtrak Arrow Off Track*

**By Tim Scannell**
CW Staff

WASHINGTON, D.C. — Although Amtrak's new computer-based ticketing and information system is called Arrow, giving the impression of speed and directness, recent problems with the system have belied that image.

In the past few weeks, thousands of travelers have been refused tickets because the system's computers erroneously reported that all of Amtrak's trains were booked, when in fact many were empty. And last month — just two weeks after the system was installed — Amtrak officials discovered that Ar-

*(Continued on Page 6)*

## *• Holiday Blitz Hits DP Shops*

**By Bob Johnson**
CW New York Bureau

NEW YORK — The holiday season means party time to most people, but for many DP shops across the country, it represents the heaviest work load of the year.

The annual heavy processing crunch affects companies that operate on a calendar year basis with a fiscal year ending Dec. 31. Among the hardest hit are financial institutions — particularly banks, which must make financial adjustments to their accounts and prepare tax information by year-end. Close behind are insurance companies and retailers that must cope with the holiday buy-

*(Continued on Page 8)*

# IBM's New Year Resolution: Higher Software Prices

**By Tom Henkel**
CW Staff

ARMONK, N.Y. — As part of its semiannual price restructuring, IBM has increased prices for virtually all program products by a whopping 15%. Purchase prices on most hardware were increased by 4% and hardware rent and lease prices are up about 8%.

Monthly maintenance fees were increased as much as 15% on older equipment; however, the maintenance increase on most newer hardware was closer to 4%, he said. Per call maintenance, educational courses and publications were raised 10%.

Increases in purchase prices, per call maintenance and publications are effective immediately. Increases in lease and rental, monthly maintenance, program products and education will be effective April 1, 1982, IBM said.

While most increases were consistent with the past four IBM price increases, the program products increases are virtually double the incre-

*(Continued on Page 4)*

# Xerox Network Systems Adopts Pentagon Protocols

**By Brad Schultz**
CW New York Bureau

NEW YORK — Xerox Corp. has given Ethernet a means of running data among networks with different architectures that is based on the Defense Department's Transmission Control Protocol (TCP) and Internet Protocol (IP).

Experts view TCP/IP as destined to radically change users' dependence on particular hardware brands [CW, Dec. 7]. Xerox literature, released to the press at a briefing here last week, credits TCP/IP as the basis of the Internet Transport Protocols in Xerox's recently introduced Network Systems (NS) protocol family [CW, Dec. 14].

These Internet Transport Protocols mark the debut of

*(Continued on Page 2)*

COMPUTERWORLD
THE NEWSWEEKLY FOR THE COMPUTER COMMUNITY

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# Network Systems Adopts TCP/IP

*(Continued from Page 1)*

TCP/IP in commercial data communications.

The debut has not merely come with one model of a certain vendor in a well-established systems class supplied by many vendors. Instead, TCP/IP have come to all models, existing and anticipated, that Xerox and several other vendors have indicated will be their entries in the local-area network product arena, which is widely expected to grow explosively in the 1980s.

Ethernet will not require the NS protocols, according to David Liddle, vice-president in charge of Xerox Office Products Division (OPD). Nor will NS protocols require Ethernet, which is itself nothing more than a few rather low-level data communications protocols, Liddle said.

But, he observed, NS protocols can run atop Ethernet to achieve smoother links among local networks deployed across the country with network architectures from different mainframe manufacturers. Liddle implied that a local network of Ethernet-based hardware, such as Xerox's Star workstations, under IBM's Systems Network Architecture (SNA) would have an easier time communicating with a local network of Stars running under Digital Equipment Corp.'s Decnet on the other side of the country.

Ethernet can run above IBM's Synchronous Data Link Control (SDLC) protocol or the International Standards Organization's High-Level Data Link Control (HDLC) protocol, Liddle said, and beneath the highest protocol layers of SNA, Decnet or other network architectures from major mainframe manufacturers.

At least 45 Ethernet systems now run in user organizations, the Xerox OPD chief asserted. All NS protocols are presently running with Ethernet in selected business environments, he maintained.

A network architecture is a hierarchical arrangement of protocols — rules for passing data through various forms of communications equipment. Architectures in the SNA class have six or seven layers. SDLC and HDLC serve the second layer of SNA and many other architectures, respectively.

Lower protocol layers concern functions at the workstation, in the sender's building and along the link to common-carrier long-haul circuits. Higher layers concern common-carrier functions, reconstruction of messages and transferred files at the receiver's end, ordering of their arrival and the mixing of messages and transferred files with running applications.

With its Pentagon-inspired NS protocols, Xerox has supplemented Ethernet with what experts would generally call fourth- or fifth-layer protocols. However, protocols — including the protocol cluster called Ethernet — are not products; they are manifest in products; higher level protocols appear in software packages that normally run in host mainframes or front-end processors.

Where are those TCP/IP software packages? The software to implement the NS protocols will be ready next year for the vendors committed to Ethernet in local net product lines and for the users expected to buy those lines, Liddle indicated.

Meanwhile, Digital Technology, Inc. may soon market a TCP/IP package to customers of DEC, which collaborated with Xerox and Intel Corp. in developing Ethernet, according to messages circulated in the Arpanet packet network [CW, Dec. 7]. That package — mostly written in the C language — would serve DEC's VAX-11/780 and 11/750 systems, messages in an Arpanet electronic mail file open to researchers interested in TCP/IP revealed.

Informed sources have stated that the Pentagon is drafting procurement specifications that mandate TCP/IP in systems sold to the military.

This anticipated requirement, during the greatest spending spree in the history of military systems procurement, and the fact that Arpanet correspondence shows TCP/IP nearly ready for IBM 360s and 370s, DEC systems, Honeywell, Inc. mainframes, Hewlett-Packard Co.'s HP-3000 supermini and other popular processors, suggest that the Pentagon's protocol pair will come to many business users in the next year or two, according to these sources.

## *Ethernet Runs Transparently*

NEW YORK — Ethernet and associated protocols will run transparent to users, Xerox Corp. vice-president David Liddle told a press briefing here last week.

Products, such as the Ethernet-based Xerox Star workstations, will be sold by "men with three-piece suits and shiny shoes" to office managers, he said. These products are not bought the same way conventional DP and telecommunications products are, the Office Products Division general manager stated.

DP and telecommunications procurement lends itself to long-term planning. Office procurement cannot be so well-planned, Liddle told the press, because the office needs change too fast.

During the briefing, Liddle characterized a Strategic, Inc. report on the role of Ethernet in Xerox's future as inaccurate and technically incomplete. The report predicted that Ethernet would fail in two years and that "Xerox is headed for the worst failure in the company's history" [CW, Nov. 23].

## *See You in '82*

Next week's issue of *Computerworld* will be a combined year-end issue. Forecast '82 will present an analysis of the year ahead and of developing trends in the industry. The issue will carry two dates, Dec. 28, 1981/Jan. 4, 1982, and will be mailed to all subscribers on Wednesday, Dec. 30. CW will resume normal weekly publication with the issue of Jan. 11, 1982.

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**The September 1, 1971 issue of COMPUTERWORLD carried a page-one story about a series of sorting benchmarks conducted at a New York bank. The article reported that a new "Synchronized Sort" had used dramatically fewer computer resources than the IBM sort programs against which it had been tested.**

**A couple of other quotes from the article are worth noting. One was that the new sort was "unbeatable by other commercially available sorts on a one-for-one comparison." The other was that "a patent is being sought to cover the new concepts" of the sort.**

That "Synchronized Sort" soon became known by a shorter, punchier name—SyncSort. And a lot of things have happened to it and to sorting during what might be called the "SyncSort Decade." Here are a few of them…

- **The Patent**—We not only applied for it, we got it. U.S. Patent 4,210,961 recognizes a long list of "sorting innovations" we pioneered throughout the decade.
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- **Productivity**—SyncSort has reinforced its reputation as the "programmer's best sorting friend." As the programmer shortage has tightened and human costs have gone up, we've constantly added new features to make simple applications that use the sort faster and easier. Things like INCLUDE/OMIT, INREC/OUTREC, SUM, and new Record Formatters.
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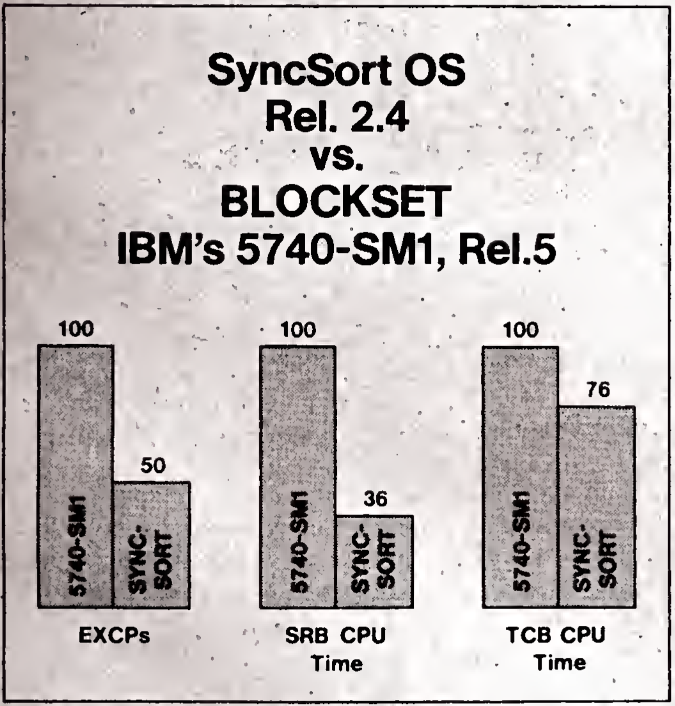

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# *Personal Computer Said Educator of the Future*

**By Brad Schultz**
CW New York Bureau

IRVINE, Calif. — The personal computer will be the dominant means of delivering education in years to come, Alfred Bork, director of the University of California at Irvine's Educational Technology Center, predicted.

The professor of physics and information and computer science said dumb terminals, tied to large computer systems, make little sense as vehicles for computer-assisted instruction (CAI). In CAI, the student-machine interface demands local computer memory and processing power to handle each student's peculiar sequence of interactions, he said.

As an alternative to personal computers, intelligent terminals could process the student's inputs on the spot and receive the supporting CAI software through down-line loading from a mainframe some distance away, Bork noted. But users — schools, libraries and homes — will have a ready supply of low-cost, yet powerful, personal computers that can execute sophisticated CAI packages resident in floppy disks.

Why does high-technology have to be a dominant delivery mechanism for education, one of the oldest social institutions? Because conventional education is failing, for many complex reasons, while society has come to demand skills in reading, writing and arithmetic plus other subjects as never before, Bork observed.

Although much research in artificial intelligence (AI) relates to learning processes, Bork maintained that little AI will appear in CAI in the next few years. AI's primary applicability to CAI would be through software that deduces the source of a student's difficulty with a subject and implements an algorithm for interaction that guides the student to better understanding.

The cognitive functions involved with such software are still open problems to AI researchers, Bork pointed out, but breakthroughs can be expected in the long run.

Market Data Retrieval of Westport, Conn., recently concluded that 15,918 U.S. public schools presently use CAI. Based on telephone interviews with all 15,442 school districts in the U.S., conducted this summer, 42% of the nation's school districts have CAI.

### Key Factors

The key factors determining whether schools will employ CAI are: grade level, size of school and wealth of the population surrounding the school, Market Data declared.

"The higher the grade level of the school, the more likely the school is to have [CAI]," a spokeswoman added. CAI was said to exist at 43% of U.S. senior high schools, 26% of junior highs and 12% of elementary schools. Nearly 60% of high schools with more than 1,000 students use CAI, but only 24% of smaller schools do so.

Wealth of the school and wealth of the population surrounding the school are the most important factors in CAI usage, the spokeswoman continued. In school districts that spend more than $75 per student for instructional materials, 46% of the districts have instructional computers. In school districts that spend less than $30 per student for instructional materials, the figure falls to 20%.

About 30% of schools in "upper income" areas use CAI, she added, but 12% of "low income" area schools can access the technology. The survey report is available from Market Data at Ketchum Place, Westport, Conn. 06880.

Information about Bork's Educational Technology Center is available from Prof. Bork, c/o Department of Physics, University of California, Irvine, Calif. 92717.

One clearinghouse of research in CAI is the Association for Computing Machinery's (ACM) Special Interest Group for Computer Uses in Education (Sigcue). The Sigcue "Bulletin" is published monthly through P.O. Box 12105, Church St. Station, New York, N.Y. 10249.

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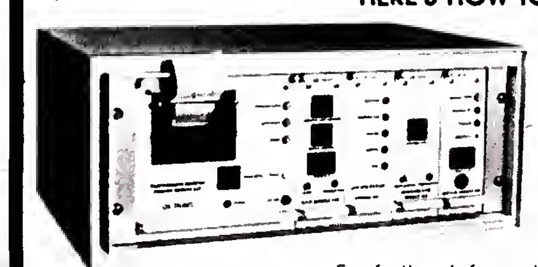

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# IBM Increases Product Prices

(Continued from Page 1)

ment of past rounds of price hikes. That means a significant jump for users of IBM software.

Within the Data Processing Division (DPD), for example, IMS/VS, which used to cost $1,140/mo, now costs $1,310. Likewise VSE/Power, formerly priced at $44/mo, now runs $51. The 8100 Host Command Facility Distributed Processing Programming Executive/Distributed Processing Control Executive (DPPX/CX) jumped from a monthly fee of $84 to $97 and the Distributed Systems License Option (DSLO) was increased by a similar percentage , IBM said.

### Spared from Hikes

Spared from the increases are new products or those which have been restructured over the past few months. These include:

- All 4300 processors
- The 3081K processors (the 3081D was increased 8% on rent and lease)
- Displaywriter, a word processor
- Model 5120 desktop processors
- System/23 Datamaster

Aside from the dramatic program product increases, DPD stayed with the tradition of encouraging users to purchase rather than lease hardware. IBM did not change the purchase price on its 3033 line and 8100 processors. But rent and lease prices were raised between 4% and 8%.

With the 3033 line, IBM has been trying to convince users of leased systems to buy the processors before that line becomes obsolete. Some observers maintain that the 3033 line has already been irrevocably damaged by announcements of two 3081 processors, while others contend that IBM plans to sell more 3033 processors in 1982 than it did during 1981.

The 4300 series missed this round of increases because the price structure for that line was revamped Nov. 18, when IBM announced the 4321 processor along with enhancements to the 4331 and 4341 groups.

IBM's somewhat controversial distributed processor, the 8100, received 8% rent and lease increases, but was exempted from purchase price increases. Maintenance on that processor went up about 4%, IBM said.

### Disk Drives

The firm's Model 3350, 3375, 3370 and 3380 disk drives all received across-the-board price increases. Rent and lease prices were increased about 8%, while purchase prices were raised 4%. IBM's smaller 3310 drives and the older Model 3340 received purchase price cuts as part of the 4300 announcement [CW, Nov. 23].

IBM's General Systems Division (GSD) raised rent, lease and purchase prices on virtually every hardware product within its purview.

In addition, the division increased prices on most software by 15%. Excluded from the software increases were some one-time software charges on Series/1 small business systems and some program products no longer supported by IBM. Field Developed Programs (FDP) and Installed User Programs (IUP) are not included in the increases.

Excluded from 8% rent and lease increases on hardware were the Model 5229 printer and 5520 administrative system. The 5229, the recently introduced System/23 Datamaster and the 5120 desktop processor, which received price cuts in October, were excluded from 4% purchase price increases, a spokesman said.

Not affected by the increases were GSD's volume discount purchase plan and the Value-Added Remarketer, an OEM discount plan. The Series/1 small business computer, System/23 Datamaster, the 5520 administrative processors, 5280 programmable data stations and 5260 point-of-sale terminals are available under the volume discount plan. Only the Series/1 is available under the Value-Added Remarketer program, according to IBM.

IBM said that the increases are part of a normal business review and reflect the impact of inflation and the cost of doing business. This is the fifth such increase since December 1979. Analysts noted that other vendors traditionally follow IBM's lead in raising prices.

# DP Issues In New Text

WASHINGTON, D.C. — *Computer Based National Information Systems, Technology and Public Policy Issues* is the title of a new publication from the U.S. Government Printing Office.

The publication includes chapters on information systems and computers; information in society; the structure of information policy; innovation, productivity and employment; privacy; the security of computer systems; government management of data processing; society's dependence on information systems; constitutional rights; regulatory and other issues; trends in computer technology; and industry structure.

The text sells for $6.50 and must be ordered by stock No. 052-003-00852-1 from the Superintendent of Documents, U.S Government Printing Office, Washington, D.C. 20402.

# Computers Enlisted for Education Improvement

**By Brad Schultz**
CW New York Bureau

IRVINE, Calif. — The U.S. may lead the world in computer technology, but American education has steadily deteriorated if annual average scores on college entrance exams are a valid indication.

The Educational Technology Center here has put computers to work in trying to improve schooling at elementary, secondary and college levels. The center, based at the University of California's Irvine campus (UCI), is directed by Dr. Alfred Bork, a professor of physics and information and computer science who recently gave *Computerworld* an account of progress in computer-assisted instruction (CAI), a field he helped pioneer.

Bork dislikes the phrase "computer-assisted instruction," explaining that "instruction" carries with it the connotation that someone is giving someone else orders. The use of that word seems to rule out interaction with the student.

The microcomputer-resident software turned out by the UCI Educational Technology Center largely consists of interactive routines designed to allow the student to learn at his own rate. To some degree, the software may clear up the confusion through an appropriate sequence of statements displayed on the micro's CRT terminal.

As a physics professor at the University of Alaska in Fairbanks, Bork began in 1960 to use computers as educational tools for his graduate students. He left Alaska in 1962 and, while spending a year on the Harvard University faculty, asked IBM whether the vendor was involved in CAI or willing to help those who were.

IBM reportedly replied that "they didn't know much about computers in education, but there's someone in Alaska."

So Bork realized he was leading the field by being the only one in it. Today, a number of CAI research projects exist at American educational institutions as well as some vendors that consider schools a potentially lucrative user base.

Since joining UCI in 1968, Bork has led in the development of software for physics students, which has reduced the need for physics professors to lecture. Students may now elect whether to take a physics course "on-line" — sans lecturer — or the old-fashioned way. According to Bork, several UCI colleagues were amazed to find many students preferring CAI to attending lectures.

### No Resistance

The physics faculty has not resisted the CAI alternative, Bork said, noting that some professors do not enjoy lecturing and most find research more fulfilling than teaching. But colleagues have also not expressed much enthusiasm.

"Computers are good for building up intuition," Bork asserted. "They have tremendous advantages over lectures, which are a spectator sport." CAI allows education to be individualized, he explained. "You can create experiential worlds."

These "worlds" might permit simulated voyages to the moon, requiring the student to apply laws of physics and techniques of mathematics in, for example, landing a "spacecraft" on lunar surface.

In one summer about five years ago, Bork and collaborators wrote all the exams UCI students must take by computer to get credit for CAI courses. The computer never gives the same exam twice because the parameters of particular questions are automatically changed, through randomizing functions, each time an exam is summoned on-line. This allows students to take exams a number of times until they register acceptable scores.

At UCI, which is not a huge university, students typically take 15,000 CAI exams in a 10-week period, Bork said.

The Educational Technology Center operates under grants from the National Science Foundation, Fund for the Improvement of Post Secondary Education and the University of California Board of Regents. After initially concentrating on college-level physics education, the center is bringing CAI to junior and senior high schools in a variety of subjects including applied mathematics, the natural sciences and what Bork termed "formal reasoning."

Bork's early CAI development employed large campus mainframes, but the center now writes much of its CAI programs in Pascal on microcomputers made by Terak Corp., Digital Equipment Corp. and Western Digital Corp.

The center intends to sell CAI software packages on floppy disks to schools and public libraries with major brands of personal computers, such as the Apple II, according to Bork.

# Bartcher Gets Nasa Medal

WALTHAM, Mass. — Ronald L. Bartcher, an employee of Honeywell, Inc.'s Federal Systems Operations, was one of four people recently awarded the National Aeronautics and Space Administration (Nasa) Exceptional Engineering Achievement Medal for his contribution to the Space Shuttle program.

The medal is the highest technical award presented by Nasa.

Bartcher was honored for his "exceptional engineering achievement in the design and implementation of the Launch Processing System Central Data Subsystem, which provided support for the Space Transportation System-Flight 1-testing and launch," according to Nasa.

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# Amtrak's Arrow Speeds in Wrong Direction

(Continued from Page 1)

row had reportedly sold 5,700 of its sleeping compartments at least twice, forcing many passengers to seek other travel arrangements.

"It has not been a happy situation for us," Debbie Marciniak, a spokeswoman for the National Railroad Passenger Corp., more commonly known as Amtrak, said. "We installed a major new piece of machinery virtually overnight without the luxury of a large amount of training time or time to work the bugs out of the system."

While most of the system's problems have been isolated and solved, Arrow is still causing some delays and raising the blood pressure of hundreds of irked travelers. The primary reason for the hitches is that ticketing and reservation agents are still unfamilar with the system, which is more complex than the one it replaced, Marciniak explained.

The Arrow system — which offically went on-line Nov. 1 — consists of three IBM 3033 computers, which are based in Philadelphia, and thousands of Honeywell, Inc. terminals and peripherals scattered throughout the country.

Previously, Amtrak had only two IBM 3033-U8 computers, each with a main memory of about 8.3M bytes, handling its reservations. However, the railway upgraded its eight-year-old automated railway ticketing system (Arts) by adding a third IBM 3033 with half the memory capacity and replacing virtually all of its old terminals with 1,598 Honeywell S-1501 terminals and 740 SPD-1525 terminal stations, Marciniak stated.

Approximately 163 of these terminals were installed at locations that previously had no computer power.

The whole system upgrade cost Amtrak about $55 million.

### Problem Eruption

Arrow is more complex and capable than Arts and is supposed to be capable of operating about 10 times faster than its predecessor. However, problems erupted soon after the new system was switched on.

For example, in one instance nine passengers were given the same reservation on the same day for a single sleeping compartment. At another point, the computer reportedly began quoting fares that differed by a hundred dollars or more.

The booking problems were traced to a programming deficiency that prevented the computer from purging old reservations or canceling reservations held by no-shows. Adding to the problem, people who wanted to cancel their reservations could not let Amtrak know because all of the telephone lines were tied up with holiday traffic.

The result: Many passengers were turned away while a lot of trains reportedly crisscrossed the country with empty seats.

Passengers were not the only ones confused and confounded by Amtrak's new computer system. Reservationists were also in the dark, mainly because the system apparently was installed without giving them time for sufficient training.

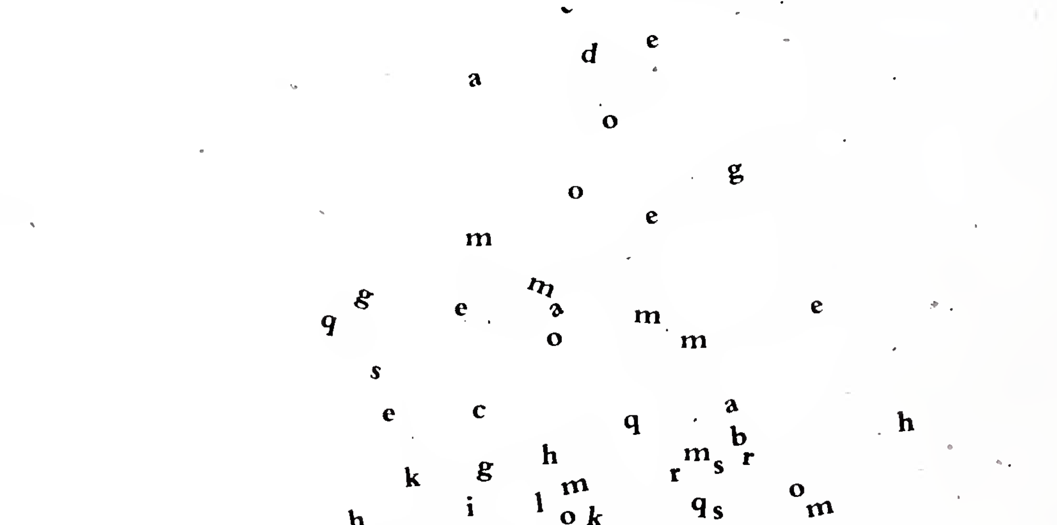
"We did have some problems with employee familiarity with the equipment," Marciniak pointed out. "It is designed to give more information and more help, but it is also more complex to operate. So it is difficult for employees to jump right in on Day One and be able to operate it as efficiently as possible."

However, things are looking up.

The programming glitch has since been fixed. And the telephone lines — although still clogged — are slowly freeing up due to an AT&T automatic call distributor installed during the overall system upgrade, Marciniak said.

Also, as employees use the system they are becoming more familiar with its capabilities and technological eccentricities, she observed. For instance, using the system, ticketing agent "talk-time"— time spent dealing with a customer on the telephone — has dropped from 10 minutes and 30 seconds to five minutes.

In the meantime, as more and more passengers try to book seats for holiday travel, Amtrak, through prerecorded telephone messages and at the ticket gate, is asking passengers to be patient as it makes the switch from one system to another.



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# Airfare Wars Daze Systems

(Continued from Page 1)

two away, according to various sources.

Referring to the patches currently required by the airline systems, until then "we get a special deal on Curads," quipped Roger Grady, a computer applications development specialist with Continental Airlines.

Today there is no way for a programmer to sit down and write out the logic for all the constraints involved in keeping up with today's fare offerings, explained Lawrence Rockind, manager of passenger services development and applications at Eastern Airlines.

Most systems in use today do not permit a display that indicates all of the constraints applying to a particular fare, he noted. What is needed is more space in the computer that allows the handling of more classes of service, Rockind maintained.

IBM's original widely used passenger airline reservation system had only three to five classes of service, so the capability of defining a product was limited to those classes of service, noted Max Hopper, vice-president of data processing and communications services for American Airlines, Inc.

### American Modifications

American has modified its basic programs to accommodate 40 classes of service. But most of the other airlines have not made similar changes, which complicates the picture when one airline tries to sell another airline's flights. Although airlines are competitors, they also sell a lot of product for one another, Hopper explained. About a year ago, American went to the Civil Aeronautics Board to explain the situation, he added.

It used to cost travelers the same amount if they flew from point A to point B regardless of the airline chosen. But in today's deregulated environment, travelers can obtain better fares if they shop around.

This shopping around behavior is causing nonproductive, costly system use. "'Every phone call results in increased system use and requires a greater number of transactions per passenger to get a final booking," Arthur Kourajian, manager of passenger services systems at Sperry Univac's Airline Industry Center, said.

It is not just a matter of simply calculating the cost of flying between point A and point B. Other variables enter into the final fare quote, including what day you fly, the time you choose to fly and how long you stay. The passenger name record (PNR) now has to go through closer scrutiny before a final fare is calculated. That takes longer processing time, he said.

Fare quotation systems are very complicated and costly to develop, he continued. Univac is in the process of revising its airline package, Usas, to reflect the frenetic rate of change in fare structures. Univac expects its updated fare quotation package to be ready for release by the end of 1982.

The ideal system will take the decision out of the travel agent's hands by allowing the computer system to analyze all the variables in the PNR and pick the lowest fare.

IBM and some of the carriers, including American and Eastern, have recently finished preliminary analysis of a fare quotation system that will accommodate the current environment, Hopper noted. However, it will probably be about three years before a new product is ready for the market, he continued.

# Casa to Publish Quarterly in '82

DEARBORN, Mich. — *CAD/CAM Technology*, a quarterly magazine for design and manufacturing engineers who work with computer-based technologies, will begin publication next spring.

The magazine will be published by the Computer and Automated Systems Association of the Society of Manufacturing Engineers (Casa/SME) for its members, but will be available to others interested in the use of computer-aided design and manufacturing (CAD/CAM) systems.

*CAD/CAM Technology* will be applications-oriented with an emphasis on new innovations in CAD/CAM techniques, according to the association. State-of-the-art articles, new product announcements, personnel changes and CAD/CAM-related events will be included.

Suscription information is available from Casa/SME, One SME Drive, P.O. Box 930, Dearborn, Mich. 48128.

*Special NTSB Investigation*

# Computer Interrupts Down After Patco Strike

**By Marguerite Zientara**
CW Staff

WASHINGTON, D.C. — The number of unscheduled air traffic control (ATC) computer interruptions fell off "significantly" at "almost every" one of 45 facilities studied after the nationwide controller strike, according to the National Transportation Safety Board (NTSB).

The two-month special investigation by 16 field personnel followed the Aug. 3 walkout of about 11,400 Professional Air Traffic Controllers Organization (Patco) members. Within the 45 facilities surveyed, about 220 controllers and supervisors were interviewed.

In addition, both aviation industry and government officials were questioned on ATC procedures and flight operations in the poststrike ATC system. Besides computer equipment reliability, the investigation included an analysis of ATC data, the ability of the Federal Aviation Administration (FAA) to meet staffing requirements and the qualifications of the controller work force.

Also studied were training for new controllers, the effects of stress and fatigue, facility supervision and management and the control of the capacity of the system.

### Board's Conclusion

The safety board concluded that "no basic ATC procedures were changed or compromised in order to keep the ATC system in operation, and that the high level of ATC safety required is possible within the present system and will be possible as the system is rebuilt."

In specifying the lowered rate of unscheduled computer interruptions after Aug. 3, the board's report noted that for the months of August 1979, 1980 and 1981, the total reported interruptions per week were 8.27, 6.62 and 4.73, respectively, for the 20 Air Route Traffic Control Centers.

Similar figures at terminal facilities could not be compared "because of equipment changes and modifications during these years," the report noted.

"However, the majority of the working controllers from these facilities stated that equipment performance was satisfactory," the report added. In spite of the reported drop in interruptions, "interviews with facility personnel did not provide conclusive evidence of improved equipment reliability," the report stated.

"Some suggested that before the strike some controllers were abusing the computer systems, which resulted in interruptions," the report continued. "Many" suggested that the smaller numbers of aircraft and stored flight plans and the restrictions on program updating and revisions during August and September were the causes of the drop, according to the report.

In the past, incorrect programs occasionally caused malfunctions during updates or maintenance, the report explained. However, statements by FAA personnel in Washington headquarters indicated that "while computer interruptions were down significantly, much of the reason was improved use of the system rather than any previous misuse," according to the report.

"The important finding, however, was that computer reliability improved during the first months of the investigation," the board stated.

Furthermore, "the allegation was made in many facilities that before Aug. 3 many controllers were putting unnecessary information in facility computers," the board reported.

"Although the safety board was unable to substantiate this allegation, if this is true, the FAA must eliminate the possibility of a similar abuse developing in the future," it continued, adding, "An awareness of the possibility is especially critical in the rebuilding years."

In the area of air safety, while industry observers have charged that the FAA pressured poststrike controllers to refrain from reporting systems errors, the board "found no evidence that working controllers were urged not to report operational errors or operational deviations.

"In fact, there was significant emphasis by FAA management at all levels on reporting these deficiencies as required," the report continued.

Additionally, the board investigated allegations from various sources regarding unqualified controllers and unsafe procedures.

Other conclusions included:

- Management changes must be made in the FAA administration of the ATC system if the problems that existed before the strike are to be resolved.
- Stress and fatigue had not emerged as major problems in the general controller work force in August and September, but these factors could become problems in the future.
- The FAA has no formal program to monitor stress and fatigue nor does it consider stress a major problem.

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# Massachusetts Drafts Computer Crime Bill

**By Tim Scannell**
CW Staff

BOSTON — A bill scheduled to go to the Massachusetts legislature next year could give this state its first computer crime law.

The bill is slated for a January hearing and the state legislature will probably review it sometime next February or March.

Sponsored by State Rep. Kenneth M. Lemanski (D-Chicopee), the bill — if enacted into law — would impose punishments and fines on anyone who knowingly and illegally gains access or attempts to gain access to information contained within a computer. Written to be broad in scope, the bill also restricts the unauthorized electronic reposition of protected information from any location. Punishments for violation of the proposed law include imprisonment for not more than five years and a fine of not more than $10,000.

### Combines Bills

Although drafted to fit into the Massachusetts general laws concerning property crime, the Lemanski bill is based on similar computer crime bills filed in Montana and Georgia — both of which were enacted earlier this year.

The Massachusetts bill also has its roots in one filed a few years ago in Florida by then State Rep. William Nelson, who is now a member of the U.S. House of Representatives. That bill was passed into law in 1978 and is considered to be one of the toughest pieces of computer crime legislation in the country.

In addition to the bill, Lemanski is also seeking to amend the larceny laws of the Commonwealth to include the electronic theft of trade secrets or management information.

Although Massachusetts is a hotbed of high-technology activity, it currently has no laws specifically prohibiting the unauthorized use of computers or restricting access to computer-based files.

"The Commonwealth is one of the major high-tech areas in the U.S. Yet we have no laws to prosecute those who could potentially violate hundreds of valuable business, government and scientific computer networks," Rep. Lemanski explained.

The Massachusetts computer crime bill could face some tough opposition when it comes up for a hearing next year. While state-level computer crime legislation has made some progress in various parts of the country, such proposed laws are usually met with strong negative attitudes.

While 15 states across the country have some sort of a law prohibiting the unauthorized use of computers, a handful more have seen bills that met with failure. States that have unsuccessfully tried to pass computer crime laws include Maryland, Missouri, Tennessee and Hawaii.

However, despite these failures, Lemanski remains optimistic about his bill. Computer-based crime is not presently running rampant in Massachusetts and "if we put something on the books now, it may deter potential criminals from using computers to commit these kinds of crimes in the future," he said.

# DP Shops Face Heaviest Work Load of Year

*(Continued from Page 1)*

ing surge.

Gearing up to meet these annual challenges, professional DPers respond in a variety of ways. Some methods are tried and true, and others are customized to meet a given shop's particular needs.

Conducting a random telephone survey of users throughout the country, *Computerworld* learned how some sites are gearing up for the anticipated processing blitz.

Getting a jump on year-end work is especially desirable in the banking area. The First National Bank of Atlanta begins processing in October, according to Barry Lawson, manager of the Data Services Division.

The schedule is based on a standardized plan — a sort of "cookbook" developed several years ago to meet end-of-year requirements, he said. "One person [usually someone from the operations or scheduling area] is picked at the beginning of the year to act as a year-end coordinator. This person writes up the year-end processing procedures, using material out of the book from previous years and we start to work," he said.

Lawson, who runs a shop that includes IBM System 370/158, 370/168 and Model 3033 CPUs, noted that the plan provides approaches for ordering forms and listing special user requirements. It also carries notations about long-running jobs and special couriers for report deliveries. "Our year-end processing runs from about Dec. 15 to Jan. 15, but because of previous experiences and the 'cookbook,' it's not a big deal anymore, from an operational and logistical approach," he commented.

### Customer Accounts

Gene Paulsen, director of DP for the Bowery Savings Bank of New York, stated that because the firm is a savings bank, the shop's main concern at year-end is to credit hundreds of thousands of customer accounts on Dec. 31. Preparation for this task starts 12 months earlier with "multithread" programming, which compiles required information throughout the year for easy access at year-end, he explained.

Similarly, First National Bank of Maryland spreads its processing work load throughout the entire year. "We sort of spread out the work by using accumulators built into our normal software," Bill Bender, vice-president of DP operations, said. The bank's IBM System/38 handles much of the general ledger financial statement work at this time of the year. This off-loading takes some of the pressure away from the in-house IBM 370/158 and Model 3033 mainframes, he noted.

Insurance companies also seem to face the year-end processing blues. A regular annual crunch occurs at the New York Life Insurance Co., according to Arthur Bauer, senior vice-president of the Electronics Department. "We have all of the monthly stuff to do and on top of it we have the once-a-year jobs, which include summaries and analyses of the previous year," he said. Although staff is not added to meet the extra work load, a substantial increase in overtime occurs at year-end, he noted.

Last year, a series of meetings between DPers and end users took place to determine what should be done at year-end, he recalled. "In retrospect, there seemed to be calamities that occurred at year-end and we wanted to prevent them from happening again," he said. Solutions, according to Bauer, included a year-end "preview," which amounts to running practice programs in November as though it was year-end. In addition, a liaison was assigned to key user departments to ensure the smooth operation of year-end work.

Another way to meet the annual push is to increase hardware capabilities. Over the Thanksgiving weekend, New York-based Royal Globe Insurance added attached processors (AP) to an environment that already included IBM 370/168 and Model 3033 CPUs. The machines were not added solely for year-end processing, R. John Kempter, vice-president of DP, explained. According to Kempter, the APs give the other CPUs additional processing power and will make the traditional "pressure cooker" situation "a lot easier."

Year-end work accounts for half of his overtime bill for the entire year and the company also hires some retirees to help meet the crush of work.

### Major Effort

The Christmas season forces retailers into a processing corner as well. Norm Laskin, vice-president of management information systems for Alexander's Department Stores in New York, said that with 60% of the store's sales occurring in December, year-end needs require a "major effort." Staffing requirements are at the highest level at this time, he noted. Currently running in a DOS environment with an IBM 370/148 CPU, the shop plans an OS conversion and Laskin hopes that the new operating environment will make December 1982 somewhat less hectic.

Ron Smith, a DPer at Hills Department Stores in Massachusetts, pointed out that the annual retailing crunch spurred the store to map out a capacity plan that included the addition of an IBM 4341 processor to help cope with some of the year-end work.

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## *Peace in Frenzied Season*

# CPU More Than Ornament for Xmas Tree Firm

PUYALLUP, Wash. — Long before that Christmas tree you buy each year reaches you, it is cut, dragged, loaded, dumped, thrown, sawed, stacked, reloaded, shipped, dumped again and restacked.

An army of high school students, housewives, migrant workers and myriad other people inflate the ranks of America's Christmas tree workers each holiday season to shepherd the trees through all of these processes.

With so many tasks and just so many people to perform them — and given that all of this work must be accomplished in two short months — it is not surprising that the Kirk Co., one of the nation's largest Christmas tree growers and distributors, sought help from computers.

### IBM System/38

Using an IBM System/38 and a network of Model 5280 terminals, Kirk is tracking trees, maintaining harvest records and expediting payroll for all of those workers.

Kirk will harvest about 1.5 million Christmas trees this year from its farm and other lands in Washington, Wisconsin, Montana, British Columbia and Nova Scotia. The trees are shipped all over the Western Hemisphere, from South America to New York.

That means a frenzied amount of business activity in a short time, and that is why Kirk turned to the computers this year.

"Needless to say, Christmas is a real hectic time for us," Managing Director Richard Reed said, explaining that the system was used to keep track of each farm's production, orders and sales.

The firm has 5280 terminals at each of its five remote locations — three in the U.S. and two in Canada. Information there can be entered into the terminals, processed and then sent to another 5280 terminal at Kirk's headquarters here in the shadow of Mt. Rainier. That information is then transferred into the System/38.

By using the distributed data systems terminals in such far-flung places as Nova Scotia, Kirk obtains fresh information each day during the hectic Christmas season.

"We know exactly where our trees are at all times. And we know it each day, not a week to 10 days later," Reed said. "It's been a problem in the past. Many times you'd end up with trees left in the yard that hadn't been sold. You don't know where they came from and why they hadn't been sold.

"We can't afford to have that, not with only a 60-day harvest season and 20% interest rates," he added.

With such a tight schedule, even a one-day mistake can cause serious problems, Reed explained.

During the harvest, Kirk cut 35,000 trees per day. Without accurate, timely information, Kirk might harvest one day too long and have 35,000 Christmas trees left over. Cut one day too short and the result would be a group of angry customers without trees.

The number of employees swells during Christmas, from a normal work force of about 225 to more than 800. The computers also are enabling Kirk to calculate and print payroll checks faster — at a time when Christmas money is important to employees.

By next Christmas, Kirk plans to be using the computers to determine exactly how much it costs to grow a majestic 10-foot Douglas fir in Washington or a perfectly tapered Scotch pine in Wisconsin.

"With day-to-day information from the computer, if costs rise, we can deal with it immediately," Reed explained.

Christmas tree companies like Kirk will harvest and sell about 30 million trees this year. Each of those trees represents several years of work. The best trees may take 10 to 12 years to grow.

Although you do not see the results of Kirk's work until December, Christmas tree farming is a year-round job.

"People these days expect the more tapered tree, the classic Christmas tree," Reed said. "In order to do that, it takes a lot more work. We do something every day of the year to Christmas trees. People don't realize that. I sure didn't. It's Christmas every day of the year for us."

Seedling trees are pruned for a few years and then are sheared every summer so the tree maintains its classic, conical Christmas-tree shape. Kirk's work force swells to about 500 employees during the summer shearing.

Harvest crews with chain saws move into the British Columbia farms in early October, while cutting begins about three to four weeks later in Nova Scotia, Washington and Wisconsin. A good harvest is about 1,000 trees to the acre.

Since pines naturally yellow a bit in the winter, Kirk uses a harmless latex green coloring on its Wisconsin pines. It has its own paint plant in Michigan, where it also produces its own plastic netting in which trees are wrapped for shipment.

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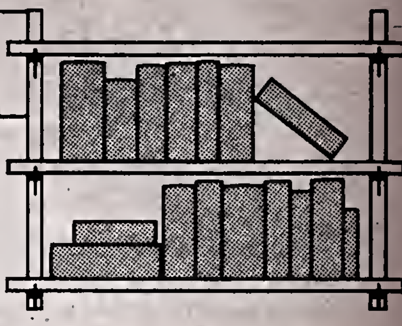

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Hardcover, 316 pages, $19.75. Lomond Publications, Inc., P.O. Box 88, Mt. Airy, Md. 21771.

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# Exec: Personnel Lack Stunts Graphics Growth

**By Jake Kirchner**
CW Washington Bureau

WASHINGTON, D.C. — A chronic personnel shortage is the biggest factor retarding growth of computer graphics, but increased academic community interest in computer graphics education may soon alleviate much of that problem, according to the keynote speaker at a recent conference here.

Addressing the National Conference on Computer Graphics, Edward K. Zimmerman, executive director of the National Computer Graphics Association (NCGA), noted "the newness of the technology and the fantastic growth of the entire field has combined to create a situation wherein there are relatively few experienced people for an evergrowing surplus of positions."

Zimmerman said the personnel shortages are particularly noticeable as computer graphics moves from basic business environments into computer-aided design and manufacturing in numerous sectors, such as automotive and aerospace industries, and into the home in the form of videotex applications, all of which are opening entirely new, billion dollar markets for computer graphics.

The excess demand for qualified personnel in the field has, he said, "pushed salaries for computer graphics professionals up 10% to 15% higher than their counterparts in closely related industries."

### Academia Involved

Fortunately, he continued, the U.S. educational system — including academic institutions, corporations, associations and the federal government — "is already gearing up to fill this personnel gap."

He noted that several major universities have already established "substantial computer graphics facilities for undergraduate and graduate students" with programs aimed at various industry applications. And corporate grants and National Science Foundation backing have provided additional funds for several computer graphics education projects, according to Zimmerman.

He added the NCGA is conducting a survey of more than 2,000 universities and colleges; "nearly half of the schools that have responded to date have already set up graphics programs and more than two-thirds are planning to expand existing programs or start new ones in the near future."

Despite this "enormous interest in and demand for computer graphics education," Zimmerman said "some institutions are still hamstrung" by a number of problems.

# CW TV Weekly Expanding in '82

*Computerworld on Television,* the weekly TV newsmagazine produced by CW Communications/Inc. (CWCI), plans to expand its broadcasting base next year from 12 stations to the top 50 markets in the U.S.

The weekly television show about computers, from the publishers of *Computerworld* newspaper, first aired last April. Twenty-eight half-hour programs have been produced and broadcast to date.

The television series has grown steadily in stature and impact, according to Patrick J. McGovern, chairman of the board of CWCI.

"Surveys indicate that most people in our industry rate the show very highly," McGovern said. "In addition, according to the latest ratings, nearly half a million people in the 12 markets where we have been available have been watching the program each week this fall. We consider this to be a successful first effort."

McGovern said that CWCI would discontinue broadcasting the program on the current 12 stations in early 1982. "Instead, we will be working on a syndication of the program to the top 50 markets in the U.S., as well as through a comprehensive cable network."

Tapes of the first 28 programs are available for rent through Deltak, Inc.; ASI, Inc.; and Edutronics, Inc., McGovern added.

A sponsor is being sought for cable broadcast of the program on the CBN cable network, according to CW Broadcasting National Manager Bill Dwyer. CBN is the second largest cable system in the country, with more than 11 million homes wired. Dwyer said he is also approaching stations in the top 50 markets to arrange for syndication of the new series of programs, starting in September 1982.

"We are already receiving strong support for this expanded program," Dwyer indicated.

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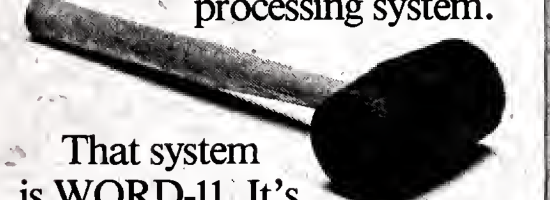

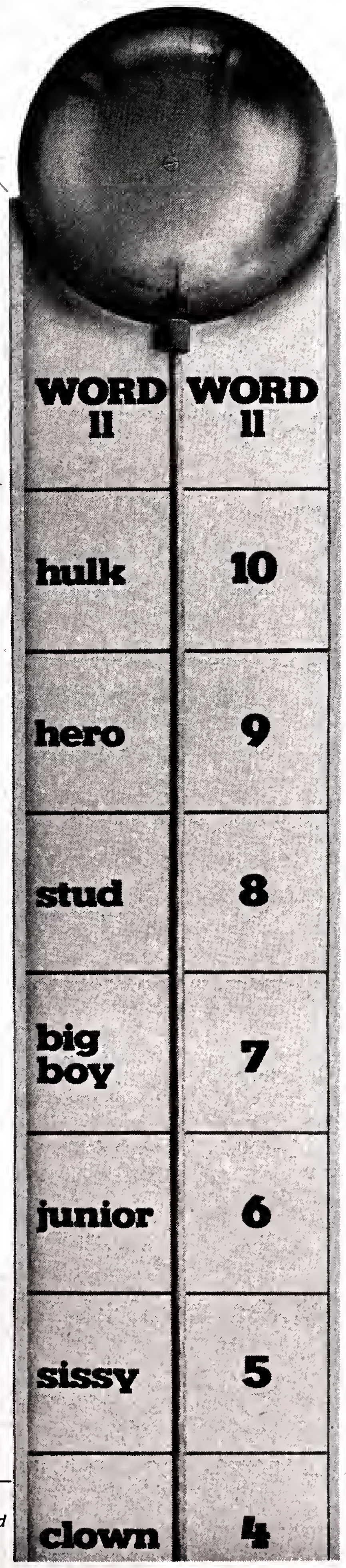

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CW Photo by M. Zientara

Marvin Minsky

# MIT Prof: Paradox Is Essence of AI

By Marguerite Zientara
CW Staff

BOSTON — The essence of artificial intelligence (AI) is a paradox: "Hard things are easy to do and easy things are hard to do."

Calling AI "a collection of the things we don't know how to do yet in computer science," MIT Donner Professor of Science Marvin Minsky closed the recent "Data Training '81" conference here with an explanation of AI's state of the art and an insight into its problems.

The founder of MIT's Artificial Intelligence Lab answered the basic question of whether it is even possible to build a truly intelligent machine: "I believe we can because people are a certain kind of machine."

On the question of when this might happen, Minsky quoted AI pioneer John McCarthy of Stanford University, who told one reporter that it could happen in "four to 400 years." McCarthy's estimate, which is as close as anyone's, according to Minsky, "annoyed the reporter suitably."

The reporter's annoyance, however, was nothing compared with those working in the field, who "every couple of years experience immense progress as well as attendant additional problems," Minsky said.

Common sense is the most difficult thing to inculcate into a computer, which is why concepts that people perceive as simple are difficult for a computer, while complicated mathematical problems that require great speed and tedious calculation are simple for a machine, but difficult for people.

While an AI program can get an A on strictly formal mathematical problems, it cannot handle word problems because of the necessary combination of syntax and semantics. This is an area "we are still working on," Minsky said.

"There is a tremendous army of exceptions in real life axioms," Minsky continued. For example, a traditional logical statement such as "sparrows are birds, birds can fly, therefore, sparrows can fly" ignores common sense rules saying that neither toy sparrows nor dead sparrows can fly. And sparrows "with 4,000 lb of concrete weight tied to their feet" cannot fly either, Minsky observed.

While adults immediately know those things — after taking years to learn them as children — a computer does not know or care about such concepts, and it is virtually impossible to list them all for the computer in every instance.

Possible solutions to these problems include new methods of automatic programming, the development of extremely fast "ultramachines" and better semantic representation in a system that is "too shallow," Minsky said.

### 'Smarter Than the Experts'

Currently, some AI programs are "smarter than the experts" in certain areas, Minsky noted, citing MIT's Macsyma, Chess and Stanford's Mycin programs. Macsyma, for example, "does calculus better in some areas than any living mathematician," he claimed. Overall, it is "as good as a college freshman; it got an A in an MIT calculus class."

Mycin is a data base of several thousand antibiotics and infections, and Chess is a "pretty good, but not that good" a chess player, Minsky said. "Chess programs in AI are not as good as human Master players because they need an overview and a strategic concept or two." But these things are difficult to program.

The world backgammon champion, however, is a computer at Carnegie-Mellon University, Pittsburgh, Pa. — a dubious distinction, according to Minsky, since backgammon "is not as rich a game as chess."

Minsky also traced the history of computing as being analogous to the history of molecular biology, which has also had its greatest progress in the last few years.

While everyone since Ada Lovelace — who struggled with theories of mechanical computation back in 1840 — has said that computers cannot be creative and can only do what they are told, Minsky noted, "That's true, but the secret of AI is that you can tell the computer to try a lot of different things to finally come up with an answer."

## Correction

CW's coverage of Data Training '81 [CW, Dec. 14] was identified by an inaccurate signature line of "CW at Training '81," which was the name of another, separate conference held the same week.

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All decisions of the judges are considered final and no representations as to their competence, skill or fairness are being made. Deadline for entries is December 31 in our offices in Framingham, MA. All entries become the property of CW Communications/Inc.

**HINT:** Quality is more important than quantity. Sending in lots of entries will not increase your chances of winning (in fact, reading through a slew of similar slogans from the same person drives us nuts!) Write down everything you can think of that tickles your fancy, then take a while to pick the two or three best ones to send in.

**Yes,** I'd like to enter your ridiculous button contest. I have read the rules. (I hope your judges can still read when they get to this one.) Here is my entry (if you have more than one, put them on separate forms).

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### *U.S. Leads in AI for Now*

# AI, Micro Architecture Seen Helping Each Other

**By Brad Schultz**
CW New York Bureau

GAINESVILLE, Fla. — In technological stature, the U.S. now stands where England was in 1900 and Japan stands where the U.S. was at that time, a prominent expert in microcomputer architecture asserted here recently.

At the turn of the century, England led the world in technology, but the U.S. (despite a brief eclipse by Germany) took the lead away, University of Florida professor Keith Doty said in an interview. The computer scientist/engineer presently contributes to several fields, including artificial intelligence (AI), which aims at building systems that reason.

AI and microcomputer architecture are research domains expected to heavily impact most major technologies (ranging from automotive to the tools of medicine, cinema, espionage and war). As experts see it, the U.S. clearly leads the world in AI (with the UK running in second place), but Japan may be pulling ahead of the U.S. and other nations in microcomputer architecture. Doty gave his views on this predicament.

### AI, Research Help Each Other

AI and research in microcomputer architecture can help each other, he pointed out. For AI's part, software that infers, deduces and extrapolates can support microcomputer design processes; microcomputer technology, on the other hand, can serve as the hardware foundation of robots, the AI machines expected to manipulate objects as well as see, hear, touch, taste and smell.

The chips and wafers turned out for microcomputer architectures will be ubiquitous, planted in many kinds of mundane appliances as well as esoteric machinery, Doty observed. But AI may have even more profound impact on the way people live. Besides raising productivity, AI may provide keys to understanding human intelligence and behavior. Applications could revolutionize education.

Still, microcomputers are here now, with Japan "threatening" American vendors while the field of AI is still in its infancy. That means Japan's move toward leadership is more visible with tangible effects for American business. American dominance of AI, on the other hand, is felt mainly in research circles, with few tangible effects for business anywhere — so far.

"I have to build a 3,000-pound robot to pick up a 50-pound payload," Doty observed. AI researchers "are nowhere near building an artificial hand," he added.

Doty himself is at work on three sets of AI problems; however, he prefers to call his research "machine intelligence." The expression "AI" suggests the objective of systems that emulate processes of the human brain, he explained. Machine intelligence aims at systems that reason, but not necessarily emulation of the brain, which is still largely a mystery.

The University of Florida professor is writing a grant proposal for a project in concurrent processing that would explore how different robot arms may work together. The world is waiting for a robot that can let its left hand know what its right hand is doing, Doty indicated.

### Single Mechanical Arm

For about two decades, AI researchers have attempted construction of a single mechanical arm that robot intelligence could maneuver in reaction to robot sensations, especially visual sensations. Doty's goal is to endow each of several arms with intelligence, let the intelligence of each arm know what the other arms do and allow an overriding intelligence to coordinate the arm motions toward an optimal solution of particular problems.

The National Science Foundation is now reviewing Doty's proposal for a grant to develop heuristic methods that would narrow the range of possible solutions to multiarm robotics. Heuristic methods are a common byproduct of AI. Developers of reasoning systems cannot afford to have their systems consider all possible alternatives for solution of a problem.

Exhaustive searches of this kind would consume far too much memory and time. Heuristic methods are short cuts — ways of eliminating search alternatives.

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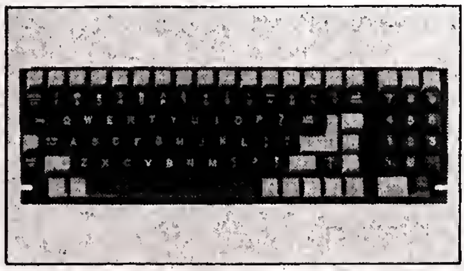

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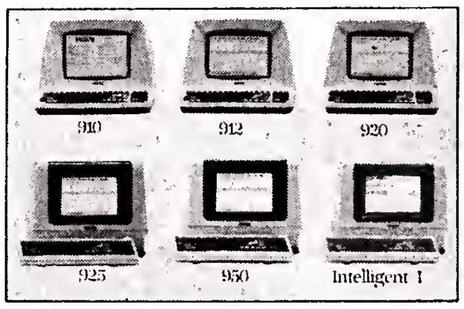

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# MBA Degree Requires Interaction

## Turnaround Time

By Larry E. Long

**Q** **I am a programmer/analyst working for a consulting firm in New York City. Based on what I have read in *Computerworld* and elsewhere, I think I would like to pursue an M.B.A. My schedule, however, makes regular class attendance somewhat difficult. It seems that something like a correspondence school might be the answer. As my knowledge in this area is largely based on the contents of matchbook covers, I thought I would ask if there are such institutions offering M.B.A.s and, if so, would you recommend this course of action?**

**A** An M.B.A. by correspondence? I hope not. Some universities have been flexible in providing a variety of formats to accommodate persons like yourself, but not correspondence schools.

A master's degree in any area is predicated on the student having frequent and significant personal interaction with his peers and professors. After all, the objective is not only to obtain the degree, but to learn something.

**Q** **I have an associate degree in business data processing. After graduation I began working as a programmer trainee in a small Hewlett-Packard Co. shop. Now I have been with the company two years and have been promoted to programmer technician. My working experience includes work with on-line applications, order-entry, sales reports, inventory, report writer, data-base and other HP software packages.**

**My question is: At this point in my career, do I need IBM experience?**

**A** IBM experience is more critical in the systems software area than in the applications software area. Your letter implies that you are primarily in a maintenance support function. Your mobility will be enhanced with some program development and systems design experience.

**Q** **I have received the results of my 1981 qualifying examination for the Certificate in Data Processing (CDP). I have failed to pass the Principles of Management section for the third time.**

**How can a person study for this examination and pass? The review material available has not changed over the years. I have used review material mentioned in the study guide and from local sources.**

**My approach to this year's examination was to use the CDP Review Manual, skim as many DP management and general management books as possible and to study the 200 review questions put out by the local technical school and the Data Processing Managers Association.**

**A** The questions in the Principles of Management section of the CDP examination reflect the management philosophy of their authors. When I took this section of the exam, it was apparent that many of the questions had two or more correct answers, depending on one's approach to management. I threw logic and experience to the wind and identified what I thought to be a basic theme and answered the questions according to how I thought they wanted them answered. Other colleagues, especially those with considerable experience in management, have related similar feelings.

The only thing I would add to your basic study approach is the formation of a study group. Hopefully, by the time the 1982 exam is administered, the questions in this section will be recompiled to remove ambiguity and the possibility of multiple interpretations.

**Q** **I am a student in business administration, specializing in business information systems. I am currently working in a small installation in the capacity of supervisor of computer operations. My career objective is to become a DP manager, but I have little experience in programming. Does one need to be knowledgeable about programming and/or data base design to become a DP manager?**

**A** A DP manager should be knowledgeable, but not necessarily experienced in programming and data base design. The successful manager will also have a working knowledge of all major facets of information services.

Of the hundreds of management information systems directors whom I have met over the years, I can count on one hand those that have not had any programming experience.

---

*Long is a professor at Lehigh University, a DP consultant and author. If you have a question you'd like him to address, send it to Larry Long, Editorial Department,* Computerworld, *P.O. Box 880, Framingham, Mass. 01701.*

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# Calendar

Jan. 25-29, Dallas — **Auditing in the Contemporary Computer.** Contact: Marge Umlor, EDP Auditors Foundation, 373 S. Schmale Road, Carol Stream, Ill. 60187.

Jan. 25-29, San Francisco — **Mark IV Consortium.** Contact: Ellen Garfield, Software Education Corp., 37th Floor, 1114 Ave. of the Americas, New York, N.Y. 10036.

Jan. 25-29, Pittsburgh, Pa. — **Structured Design and Programming Workshop.** Contact: BSI, 4720 Montgomery Lane, Bethesda, Md. 20814.

Jan. 25-29, New York — **CICS/VS Command Language.** Contact: Boeing Computer Services Co., 560 Lexington Ave., New York, N.Y. 10022.

Jan. 25-29, Washington, D.C. — **A Tutorial on Digital Communications.** Contact: The George Washington University, School of Engineering and Applied Science, Washington, D.C. 20052.

Jan. 25-29, Dallas — **CICS/VS Application Programming (Macro Level).** Contact: On-Line Software International, 65 Rt. 4 E., River Edge, N.J. 07661.

Jan. 25-29, Waltham, Mass. — **DP Disaster Recovery Seminars.** Contact: EDP Security, Inc., 181 West St., Waltham, Mass. 02154.

Jan. 26-27, Wellesley, Mass. — **User's Role in Systems Development.** Contact: Priscilla Goudreault, Q.E.D. Information Sciences, Inc., P.O. Box 181, Q.E.D. Plaza, Wellesley, Mass. 02181.

Jan. 26-28, Chicago — **Screen Design.** Contact: Priscilla Goudreault, Q.E.D. Information Sciences, Inc., P.O. Box 181, Q.E.D. Plaza, Wellesley, Mass. 02181.

Jan. 26-28, New York — **Computer Graphics for Business.** Contact: American Management Associations, 135 W. 50th St., New York, N.Y. 10020.

Jan. 26-28, Carmel, Calif. — **Integrated Digital Networks.** Contact: Institute for Graphic Communication, Inc., 4th Floor, 375 Commonwealth Ave., Boston, Mass. 02115.

Jan. 26-29, New York — **Procedure Formation Workshop.** Contact: Jill Hyman, Information Methods Corp., 504 Totten Pond Road, Waltham, Mass. 02154.

Jan. 27, Tulsa, Okla. — **Management Overview of Data Structured Systems Design.** Contact: Jim Highsmith, Ken Orr and Associates, Inc., 715 E. 8th, Topeka, Kan. 66607. Also being held Jan. 29 in Omaha, Neb.

Jan. 27-29, Arlington, Texas — **Project Management and Control.** Contact: Priscilla Goudreault, Q.E.D. Information Sciences, Inc., P.O. Box 181, Q.E.D. Plaza, Wellesley, Mass. 02181.

Jan. 27-29, St. Louis — **Network Protocols.** Contact: The American Institute for Professional Education, Carnegie Building, 100 Kings Road, Madison, N.J. 07940.

Jan. 27-29, New York — **American Institute's Courses on DP-Related Topics.** Contact: The American Institute for Professional Education, Carnegie Building, 100 Kings Road, Madison, N.J. 07940.

Jan. 27-29, Los Angeles — **Managing the Maintenance of Programs and Systems Workshop.** Contact: Dr. Ned Chapin, Infosci, Inc., Box 7117, Menlo Park, Calif. 94025.

Jan. 28-29, Toronto — **Information Engineering Overview.** Contact: Jill Hyman, Information Methods Corp., 504 Totten Pond Road, Waltham, Mass. 02154.

Jan. 28-29, San Diego — **Modeling and Simulation on Microcomputers.** Contact: The Society for Computer Simulation, P.O. Box 2228, La Jolla, Calif. 92038.

Jan. 28-29, Miami — **IMS Systems Management Workshop.** Contact: Sondra Schwartz, Boole & Babbage, Inc., Educational Services Division, 510 Oakmead Pkwy., Sunnyvale, Calif. 94086.

Jan. 28-29, Los Angeles — **Data Processing for the Non-Data Processing Professional.** Contact: Data Processing Management Association Education Foundation, P.O. Box 91295, Department DP/NDP, Los Angeles, Calif. 90009.

Jan. 28-29, Los Angeles — **Managing Documentation & Documentation Standards.** Contact: Carnegie Press Center for Documentation Resources, 100 Kings Road, Madison, N.J. 07940.

Jan. 31, Calgary, Alta. — **DP Training Managers' Workshop.** Contact: Sharon A. Stahlheber, Deltak, Inc., 1220 Kensington Road, Oak Brook, Ill. 60521.

## ABA Workshop Set for February

LOS ANGELES — The American Bankers Association's (ABA) Bank Telecommunications Workshop is slated to take place here Feb. 7-10, 1982.

The workshop will be keynoted by James E. Olson, vice-chairman of the board of AT&T, who will speak on AT&T's fully separated subsidiary and its impact on the industry. Key topics to be discussed at the event include the wider impact of deregulation on future planning in telecommunications and the new Federal Reserve Communications System, FRCS 80.

Registration costs $390 for ABA members and $490 for nonmembers. Additional information and registration forms are available from Sheldon Golub at ABA headquarters, 1120 Connecticut Ave., N.W., Washington, D.C. 20036.

## Monthly Targets IBM 8100 Users

CUPERTINO, Calif. — *Update/PX* is a new monthly newsletter for IBM 8100/DPPX users published by DPX, Inc.

The newsletter will include IBM product announcements, product evaluations, IBM's 8100 strategy, third-party hardware and software, advice and warnings based on user experience, 8100 user surveys and case histories, manuals, fix packages, course conferences and more.

An annual subscription to the newsletter costs $96. Further information is available from DPX at 10902 Northfield Square, Cupertino, Calif. 95014.

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# Users Rate Their Software

## Proprietary Software: User Ratings and Cluster Analysis

| Vendor and Package Name | No. of User Ratings Received | Mean Average User Ratings | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Reliability | Efficiency | Ease of Installation | Ease of Use | Vendor's Technical Support | | | Vendor's Maintenance | Overall Satisfaction |
| | | | | | | Trouble Shooting | Documentation | User Education | | |
| Admins Inc. | | | | | | | | | | |
| Admins | 5 | 3.6 | 3.0 | 3.8 | 3.6 | 3.2 | 2.8 | 2.6 | 3.0 | 3.2 |
| Advanced Data Management | | | | | | | | | | |
| DRS | 3 | 3.0 | 2.3 | 3.0 | 3.0 | 3.0 | 2.3 | 3.0 | 3.5 | 3.0 |
| AIS | | | | | | | | | | |
| AIS-10 | 3 | 2.7 | 3.0 | 3.0 | 2.7 | 1.7 | 2.0 | 1.7 | 1.5 | 2.0 |
| Allen Services Inc. | | | | | | | | | | |
| MSI | 3 | 2.7 | 3.0 | 3.0 | 3.3 | 2.0 | 2.7 | 2.0 | 1.7 | 2.7 |
| Altergo | | | | | | | | | | |
| Shadow II | 9 | 3.3 | 3.3 | 3.0 | 3.2 | 2.6 | 2.8 | 2.7 | 2.9 | 3.0 |
| AM Jaquard | | | | | | | | | | |
| Type Write | 4 | 3.5 | 3.3 | 3.5 | 3.8 | 3.0 | 3.3 | 3.0 | 2.5 | 3.3 |
| Arthur Andersen | | | | | | | | | | |
| Accounts Payable | 4 | 3.0 | 3.0 | 2.3 | 2.5 | 3.3 | 3.0 | 2.3 | 2.5 | 2.8 |
| General Ledger | 3 | 3.7 | 3.0 | 3.3 | 3.0 | 3.7 | 3.7 | 3.3 | 3.0 | 3.7 |
| MAC-PAC | 4 | 2.8 | 2.0 | 2.5 | 2.3 | 2.5 | 2.3 | 2.3 | 1.8 | 2.8 |
| Apple | | | | | | | | | | |
| Applesoft/DOS | 5 | 3.8 | 3.2 | 3.8 | 3.4 | 3.0 | 3.4 | 3.2 | 3.3 | 3.6 |
| Controller | 3 | 3.7 | 1.7 | 2.7 | 3.3 | 3.0 | 3.7 | 3.0 | 2.7 | 2.3 |
| Applications Software Inc. | | | | | | | | | | |
| ASI-ST | 4 | 3.3 | 3.0 | 2.5 | 2.5 | 2.0 | 2.3 | 2.0 | 2.3 | 2.7 |
| Applied Data Research, Inc. | | | | | | | | | | |
| DATACOM/DB | 7 | 3.1 | 3.4 | 3.0 | 3.3 | 3.1 | 2.6 | 2.6 | 2.9 | 3.0 |
| DATACOM/DC | 5 | 3.2 | 3.4 | 2.0 | 3.6 | 2.0 | 2.4 | 2.2 | 2.4 | 3.2 |
| LIBRARIAN | 56 | 3.7 | 3.4 | 3.3 | 3.4 | 3.0 | 3.1 | 3.0 | 3.2 | 3.4 |
| LOOK | 4 | 4.0 | 3.5 | 3.5 | 4.0 | 3.7 | 3.0 | 2.5 | 3.3 | 3.5 |
| Meta Cobol | 3 | 3.3 | 3.0 | 3.0 | 2.7 | 2.5 | 3.0 | 2.7 | 3.3 | 3.0 |
| ROSCOE | 63 | 3.6 | 3.5 | 3.1 | 3.4 | 2.9 | 2.9 | 2.7 | 3.1 | 3.3 |
| VOLLIE | 21 | 3.8 | 3.5 | 3.5 | 3.8 | 3.1 | 3.3 | 3.1 | 3.3 | 3.1 |
| Argonaut Info. Systems | | | | | | | | | | |
| Account Payable | 3 | 3.0 | 3.0 | 3.0 | 2.7 | 3.0 | 2.7 | 3.0 | 3.0 | 2.7 |
| Payroll/Personnel | 4 | 3.8 | 3.3 | 3.0 | 3.0 | 2.5 | 3.5 | 2.3 | 3.3 | 3.3 |
| Arista Manufacturing Systems | | | | | | | | | | |
| Arista | 3 | 2.3 | 1.0 | 1.3 | 1.7 | 1.7 | 1.0 | 1.7 | 1.7 | 1.7 |
| Ashton-Tate | | | | | | | | | | |
| DBass-II | 5 | 3.6 | 3.8 | 3.4 | 3.2 | 3.2 | 3.0 | 2.8 | 3.2 | 3.0 |
| ASK Computer Systems | | | | | | | | | | |
| ASK | 5 | 3.0 | 3.2 | 3.0 | 3.2 | 2.8 | 2.2 | 1.6 | 2.4 | 3.4 |
| Man Man | 3 | 3.3 | 3.3 | 3.7 | 3.7 | 2.7 | 3.0 | 3.0 | 2.7 | 3.3 |
| Atlantic Software | | | | | | | | | | |
| PC/70 | 5 | 3.0 | 2.4 | 2.2 | 2.4 | 2.2 | 2.6 | 2.2 | 2.2 | 2.4 |

LEGEND: Mean average user ratings for each package, as tabulated above, were calculated on a scale of 4 for each user rating of Excellent, 3 for Good, 2 for Fair, and 1 for Poor.

Separate cluster analyses were then made of the mean average user ratings for all packages rated by three or more respondents. These cluster analyses were used to determine the ranges of mean average user ratings which can be interpreted as being in the highest cluster, the second, the third, and the fourth or lowest cluster for each characteristic. The mean averages which fall into each cluster group for each characteristic are listed at the bottom of the facing page. The resulting hierarchical cluster groupings for each package are tabulated on the facing page.

REPRODUCED WITH PERMISSION

| Vendor and Package Name | No. of User Ratings Received | Hierarchical Cluster Groupings | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Reliability | Efficiency | Ease of Installation | Ease of Use | Vendor's Technical Support | | | Vendor's Maintenance | Overall Satisfaction |
| | | | | | | Trouble Shooting | Documentation | User Education | | |
| Admins Inc | | | | | | | | | | |
| Admins | 5 | 2 | 2 | 1 | 2 | 2 | 2 | 2 | 2 | 2 |
| Advanced Data Management | | | | | | | | | | |
| DRS | 3 | 3 | 3 | 2 | 2 | 2 | 3 | 2 | 2 | 2 |
| AIS | | | | | | | | | | |
| AIS-10 | 3 | 3 | 2 | 2 | 3 | 4 | 3 | 3 | 4 | 4 |
| Allen Services Inc. | | | | | | | | | | |
| MSI | 3 | 3 | 2 | 2 | 2 | 4 | 2 | 3 | 4 | 2 |
| Altergo | | | | | | | | | | |
| Shadow II | 9 | 2 | 1 | 2 | 2 | 3 | 2 | 2 | 2 | 2 |
| AM Jaquard | | | | | | | | | | |
| Type Write | 4 | 2 | 1 | 1 | 1 | 2 | 2 | 2 | 3 | 2 |
| Arthur Andersen | | | | | | | | | | |
| Accounts Payable | 4 | 3 | 2 | 3 | 3 | 2 | 2 | 3 | 3 | 2 |
| General Ledger | 3 | 1 | 2 | 2 | 2 | 1 | 1 | 1 | 2 | 1 |
| MAC-PAC | 4 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 4 | 2 |
| Apple | | | | | | | | | | |
| Applesoft/DOS | 5 | 1 | 2 | 1 | 2 | 2 | 2 | 1 | 2 | 1 |
| Controller | 3 | 1 | 4 | 2 | 2 | 2 | 1 | 2 | 3 | 3 |
| Applications Software Inc | | | | | | | | | | |
| ASI-ST | 4 | 2 | 2 | 3 | 3 | 4 | 3 | 3 | 3 | 2 |
| Applied Data Research, Inc. | | | | | | | | | | |
| DATACOM/DB | 7 | 2 | 1 | 2 | 2 | 2 | 3 | 2 | 2 | 2 |
| DATACOM/DC | 5 | 2 | 1 | 3 | 2 | 4 | 3 | 3 | 3 | 2 |
| LIBRARIAN | 56 | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 2 | 1 |
| LOOK | 4 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 1 |
| Meta Cobol | 3 | 2 | 2 | 2 | 3 | 3 | 2 | 2 | 2 | 2 |
| ROSCOE | 63 | 2 | 1 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| VOLLIE | 21 | 1 | 1 | 1 | 1 | 2 | 2 | 1 | 2 | 1 |
| Argonaut Info. Systems | | | | | | | | | | |
| Account Payable | 3 | 3 | 2 | 2 | 3 | 2 | 2 | 2 | 2 | 2 |
| Payroll/Personnel | 4 | 1 | 1 | 2 | 2 | 3 | 1 | 3 | 2 | 2 |
| Arista Manufacturing Systems | | | | | | | | | | |
| Arista | 3 | 4 | 4 | 4 | 4 | 4 | 4 | 3 | 4 | 4 |
| Ashton-Tate | | | | | | | | | | |
| DBass-II | 5 | 2 | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 2 |
| ASK Computer Systems | | | | | | | | | | |
| ASK | 5 | 3 | 2 | 2 | 2 | 2 | 3 | 3 | 3 | 1 |
| Man Man | 3 | 2 | 1 | 1 | 1 | 2 | 2 | 2 | 3 | 2 |
| Atlantic Software | | | | | | | | | | |
| PC/70 | 5 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| NOTE: The range of average user ratings attributed to each cluster for each characteristic is as follows: | | | | | | | | | | |
| Cluster 1: | | 3.66 to 4.00 | 3.27 to 4.00 | 3.39 to 4.00 | 3.62 to 4.00 | 3.60 to 4.00 | 3.50 to 4.00 | 3.10 to 4.00 | 3.66 to 4.00 | 3.39 to 4.00 |
| Cluster 2: | | 3.08 to 3.65 | 2.66 to 3.26 | 2.66 to 3.38 | 2.85 to 3.61 | 2.69 to 3.59 | 2.70 to 3.49 | 2.50 to 3.09 | 2.88 to 3.65 | 2.70 to 3.38 |
| Cluster 3: | | 2.50 to 3.07 | 2.00 to 2.65 | 1.66 to 2.65 | 2.00 to 2.84 | 2.14 to 2.68 | 2.00 to 2.69 | 1.60 to 2.49 | 2.00 to 2.87 | 2.14 to 2.69 |
| Cluster 4: | | Below 2.50 | Below 2.00 | Below 1.66 | Below 2.00 | Below 2.14 | Below 2.00 | Below 1.60 | Below 2.00 | Below 2.14 |

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# Datapro's User Ratings of Proprietary Software

## • Cluster Scheme Aids Classification

**By Lois Paul**
CW Staff

DELRAN, N.J. — A hierarchical clustering scheme was used for Datapro Research Corp.'s "User Ratings of Proprietary Software" report to classify its results.

Question 8 from the questionnaire asked for responses on nine attributes of a software package. Each response was measured on a four-point scale. The list of software packages was reduced to a set of approximately 417 by the requirement that each package be rated by at least three individuals. For each of these packages, mean ratings were recorded for each of the nine attributes. Based on this data, cluster analysis was performed to provide an objective procedure for grouping similar packages.

For each attribute such as reliability and ease of use, the packages were divided into distinct groups so the mean ratings for packages within a given group would be as similar as the data would allow.

Four clusters were identified for each attribute. The mean average ratings for each package were determined on a scale where four equals excellent and one equals poor.

A cluster position of one in all nine areas of package evaluation means that the package was among the highest rated packages for all factors. Nineteen packages were rated in the highest cluster in each category.

## • Response Better To Phone Surveys

DELRAN, N.J. — People apparently are more willing to talk on the telephone about their software packages than answer a mail survey.

This is what Datapro Research Corp. surveyors discovered during their ninth annual survey on "User Ratings of Proprietary Software."

The first mailing of the two-page questionnaire was made on July 24 to a sample comprised of 9,996 names selected from the *Computerworld* circulation list.

Because of the poor response to the mail survey (only 1,340 completed the questionnaire), a test of 50 telephone interviews using the same questionnaire was conducted as an alternative.

Almost twice as many complete interviews were accomplished by telephone (2,562) than were received via the mail. In total, 39.3% of the effective sample was surveyed.

Business and industries represented in the survey sample included wholesale and retail trade; financial institutions, insurance companies and real estate firms; non-DP business services; and government.

Typical titles of recipients of the survey included director and manager of operations planning or administrative services; director, manager or supervisor of DP services; systems manager and systems analyst; and manager or supervisor of programming.

**User Ratings of Proprietary Software**

Applied Data Research Inc.
- Librarian
- Vollie

Computer Associates
- CA-Dyam/T
- CA-Sort

Cincom Systems
- Total

Cullinane
- IDMS

Dylakor Software
- Dyl 260

IBM
- VSE/ICCF
- Mapics
- VM

Information Software
- Mark IV

Innovation Data Processing
- FDR/Compaktor

Pansophic
- Easytrieve
- Panvalet

Personal Software
- Visicalc

Software AG of N.A.
- Adabase

SAS Institute
- SAS

Syncsort Inc.
- Syncsort

University Computing
- UCC 1

Source: Datapro Research Corp.

**These are the 19 packages rated highest on all nine evaluation characteristics included in Datapro Research Corp.'s "User Ratings of Proprietary Software." The categories were reliability, efficiency, ease of installation, ease of use, vendor's technical support (troubleshooting, documentation and user education), vendor maintenance and overall satisfaction.**

| Package Which Comes First to Mind | Packages Most Likely To Buy Next | Package Used Most In Past 12 Months |
|---|---|---|
| Data Management | Accounting | "Unsure" |
| "Unsure" | "Unsure" | Accounting |
| Accounting | Data Management | Utilities |
| Utilities | Utilities | Data Management |
| Manufacturing | Computer Management Aids | Data Communications |
| Systems Programs | Manufacturing | Systems Programs |
| Data Communications | Sytems Programs | Manufacturing |
| Computer Management Aids | Data Communications | Computer Management Aids |
| Payroll/Personnel | Payroll/Personnel | Language Processors |
| Banking & Finance | Engineering and Scientific | Payroll/Personnel |
| Language Processors | Language Processors | Banking & Finance |
| Engineering Scientific | Banking & Finance | Engineering Scientific |
| Math and Statistics | Math and Statistics | Math and Statistics |
| Programming Aids | Programming Aids | Programming Aids |
| Education | Education | Medical & Health |
| Medical & Health | Insurance | Insurance |
| Insurance | Medical & Health | Education |
| Management Science | Sales & Distribution | Sales & Distribution |
| Sales & Distribution | Miscellaneous | Management Science |
| Miscellaneous | Management Science | Miscellaneous |

Source: Datapro Research Corp.

**Package Considered First, Future Market Share, Market Share**

## • Users Lack Focused View of Software

DELRAN, N.J. — Users as a whole do not have a clearly focused way of thinking about software packages, software vendors or software functions.

This was revealed by the "User Ratings of Proprietary Software" survey conducted by Datapro Research Corp. here through questions surveying user awareness of software packages by vendor, package name or function.

Questions were included to determine the user's "first reaction," which would be the software package that first comes to mind; the "share of the market," which was the package it used most in the past 12 months; and "share of future market," which would be the package the user is most likely to buy next, the vendor said.

A high scorer in each case was the response "Unsure" (see chart). Data management, accounting and utilities packages were among the most frequent packages that users listed in each category. However, the responses in general were extremely diverse, Datapro said.

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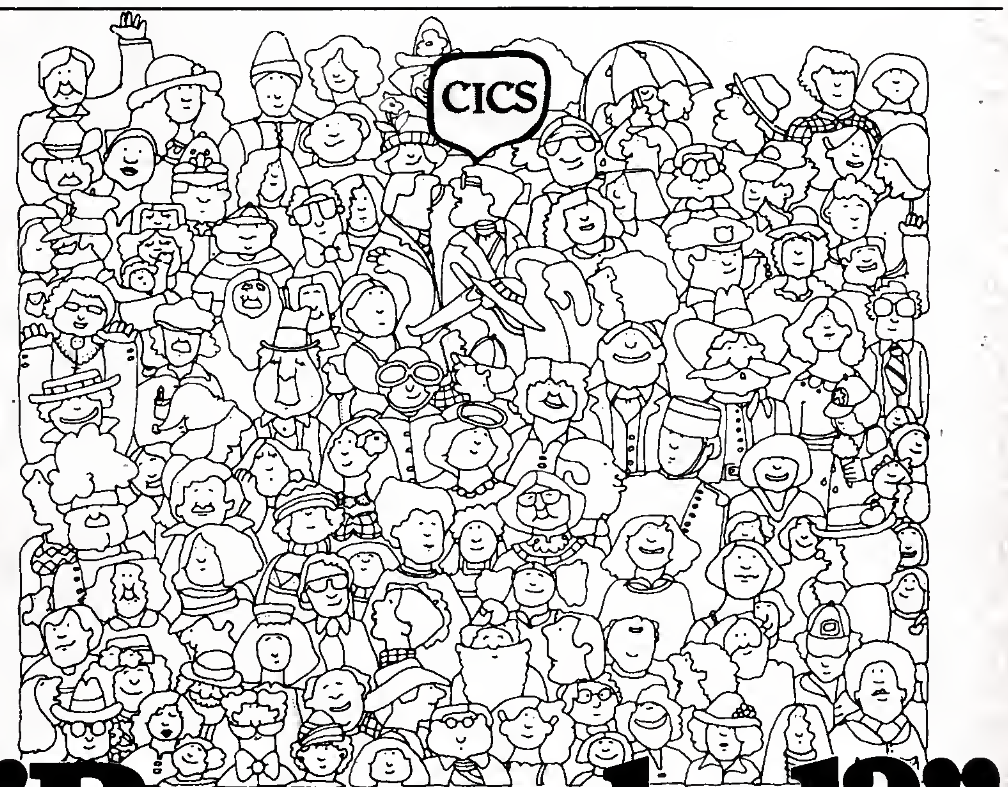

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# Users Rate Their Software

## Proprietary Software: User Ratings and Cluster Analysis

| Vendor and Package Name | No. of User Ratings Received | Mean Average User Ratings: Reliability | Efficiency | Ease of Installation | Ease of Use | Vendor's Technical Support: Trouble Shooting | Documentation | User Education | Vendor's Maintenance | Overall Satisfaction |
|---|---|---|---|---|---|---|---|---|---|---|
| Bancroft Computer Systems | | | | | | | | | | |
| Accounts Payable | 3 | 3.3 | 2.7 | 3.0 | 3.0 | 3.0 | 3.0 | 2.7 | 3.3 | 3.3 |
| BGS Systems Inc. | | | | | | | | | | |
| Best/1 | 3 | 3.0 | 2.7 | 3.3 | 3.7 | 2.7 | 2.7 | 2.7 | 3.5 | 3.3 |
| Boole & Babbage | | | | | | | | | | |
| CMF | 5 | 3.8 | 3.6 | 3.6 | 3.0 | 3.0 | 3.0 | 2.8 | 3.0 | 3.4 |
| Control/IMS | 4 | 3.0 | 2.8 | 2.3 | 2.5 | 3.0 | 3.0 | 2.8 | 3.2 | 3.0 |
| Control/SMF | 3 | 3.3 | 3.0 | 2.7 | 2.3 | 2.0 | 2.0 | 2.0 | 2.7 | 2.7 |
| RESOLVE | 3 | 3.3 | 3.3 | 3.0 | 3.7 | 3.0 | 3.7 | 2.5 | 3.0 | 3.3 |
| Secure | 3 | 2.7 | 2.3 | 2.0 | 2.7 | 2.7 | 2.0 | 1.3 | 1.7 | 2.3 |
| Burroughs Corp. | | | | | | | | | | |
| Audit Reporter | 4 | 3.8 | 3.5 | 3.8 | 3.8 | 3.0 | 3.3 | 3.3 | 3.5 | 3.5 |
| CANDE | 22 | 3.8 | 3.5 | 3.6 | 3.6 | 2.8 | 2.6 | 2.6 | 3.0 | 3.3 |
| CMS | 4 | 3.5 | 3.0 | 3.3 | 3.0 | 2.3 | 3.0 | 2.8 | 2.3 | 3.0 |
| DMS | 4 | 3.5 | 3.3 | 3.5 | 3.0 | 2.8 | 2.8 | 3.0 | 3.0 | 3.3 |
| DMS-II | 29 | 3.5 | 3.1 | 3.1 | 3.3 | 2.2 | 2.4 | 2.4 | 2.7 | 3.0 |
| General Ledger | 3 | 3.7 | 3.0 | 3.0 | 3.0 | 3.0 | 2.0 | 2.7 | 2.7 | 3.0 |
| GEMCOS | 8 | 3.5 | 2.5 | 2.8 | 2.8 | 1.6 | 1.9 | 1.6 | 2.4 | 2.8 |
| IPS | 3 | 4.0 | 3.3 | 3.0 | 3.3 | 3.3 | 2.7 | 3.3 | 3.0 | 3.0 |
| MCP | 19 | 3.7 | 3.6 | 3.5 | 3.6 | 2.7 | 2.6 | 2.4 | 2.9 | 3.4 |
| NDL | 6 | 3.7 | 3.5 | 3.5 | 3.7 | 2.3 | 2.5 | 2.5 | 2.8 | 3.5 |
| Odesy | 6 | 3.3 | 3.0 | 2.8 | 3.2 | 1.8 | 2.0 | 1.5 | 2.2 | 3.0 |
| Payroll | 5 | 3.2 | 3.0 | 2.4 | 2.8 | 2.6 | 2.4 | 3.0 | 3.0 | 3.0 |
| PCS | 6 | 3.7 | 3.2 | 3.3 | 2.8 | 2.8 | 2.7 | 2.3 | 2.7 | 3.2 |
| PCS III | 4 | 3.3 | 3.0 | 3.3 | 2.5 | 2.8 | 2.5 | 3.0 | 2.0 | 2.8 |
| Text Editor | 4 | 3.8 | 3.5 | 3.8 | 3.8 | 3.0 | 3.0 | 3.0 | 3.3 | 3.8 |
| Thrift | 6 | 3.6 | 3.6 | 2.8 | 3.2 | 2.6 | 2.2 | 1.8 | 2.8 | 3.2 |
| Cambridge | | | | | | | | | | |
| ACF-2 | 12 | 3.8 | 3.8 | 3.1 | 3.7 | 3.3 | 3.3 | 3.2 | 3.5 | 3.8 |
| ASM-2 | 8 | 3.3 | 3.1 | 3.1 | 3.1 | 3.0 | 3.0 | 3.2 | 3.1 | 2.9 |
| Candle Corp. | | | | | | | | | | |
| Omegamon | 23 | 3.9 | 3.7 | 3.8 | 3.3 | 3.5 | 2.8 | 3.0 | 3.4 | 3.6 |
| Capex | | | | | | | | | | |
| Optimizer | 4 | 3.5 | 2.8 | 3.5 | 3.8 | 3.5 | 3.0 | 2.5 | 2.7 | 2.7 |
| Optimizer III | 10 | 3.8 | 3.5 | 3.6 | 3.7 | 3.4 | 3.3 | 2.8 | 3.1 | 3.4 |
| TLMS II | 6 | 3.3 | 2.2 | 2.7 | 2.7 | 2.2 | 2.5 | 2.0 | 2.0 | 2.8 |
| Century Analysis | | | | | | | | | | |
| Boss 3 | 10 | 3.3 | 3.3 | 2.8 | 3.2 | 3.3 | 3.0 | 3.1 | 3.3 | 3.2 |
| CFS Inc. | | | | | | | | | | |
| Docs | 5 | 4.0 | 4.0 | 3.8 | 4.0 | 3.8 | 3.0 | 3.2 | 3.8 | 3.8 |
| Cincom Systems | | | | | | | | | | |
| Environ/1 | 5 | 3.8 | 3.4 | 3.0 | 3.2 | 3.0 | 2.8 | 2.8 | 2.8 | 3.0 |
| Mantis | 6 | 3.7 | 3.5 | 3.5 | 3.3 | 3.3 | 2.8 | 2.7 | 2.8 | 3.5 |
| Total | 54 | 3.4 | 2.9 | 3.0 | 3.0 | 2.6 | 2.7 | 2.8 | 2.8 | 3.0 |

LEGEND: Mean average user ratings for each package, as tabulated above, were calculated on a scale of 4 for each user rating of Excellent, 3 for Good, 2 for Fair, and 1 for Poor.

Separate cluster analyses were then made of the mean average user ratings for all packages rated by three or more respondents. These cluster analyses were used to determine the ranges of mean average user ratings which can be interpreted as being in the highest cluster, the second, the third, and the fourth or lowest cluster for each characteristic. The mean averages which fall into each cluster group for each characteristic are listed at the bottom of the facing page. The resulting hierarchical cluster groupings for each package are tabulated on the facing page.

REPRODUCED WITH PERMISSION

| Vendor and Package Name | No. of User Ratings Received | Hierarchical Cluster Groupings: Reliability | Efficiency | Ease of Installation | Ease of Use | Vendor's Technical Support: Trouble Shooting | Documentation | User Education | Vendor's Maintenance | Overall Satisfaction |
|---|---|---|---|---|---|---|---|---|---|---|
| Bancroft Computer Systems | | | | | | | | | | |
| Accounts Payable | 3 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| BGS Systems Inc. | | | | | | | | | | |
| Best/1 | 3 | 3 | 2 | 2 | 1 | 2 | 2 | 2 | 2 | 2 |
| Boole & Babbage | | | | | | | | | | |
| CMF | 5 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 1 |
| Control/IMS | 4 | 3 | 2 | 3 | 3 | 2 | 2 | 2 | 2 | 2 |
| Control/SMF | 3 | 2 | 2 | 2 | 3 | 4 | 3 | 3 | 3 | 2 |
| RESOLVE | 3 | 2 | 1 | 2 | 1 | 2 | 1 | 2 | 2 | 2 |
| Secure | 3 | 3 | 3 | 3 | 3 | 2 | 3 | 4 | 4 | 3 |
| Burroughs Corp. | | | | | | | | | | |
| Audit Reporter | 4 | 1 | 1 | 1 | 1 | 2 | 2 | 1 | 2 | 1 |
| CANDE | 22 | 1 | 1 | 1 | 2 | 2 | 3 | 2 | 2 | 2 |
| CMS | 4 | 2 | 2 | 2 | 2 | 3 | 2 | 2 | 3 | 2 |
| DMS | 4 | 2 | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 2 |
| DMS-II | 29 | 2 | 2 | 2 | 2 | 3 | 3 | 3 | 3 | 2 |
| General Ledger | 3 | 1 | 2 | 2 | 2 | 2 | 3 | 2 | 3 | 2 |
| GEMCOS | 8 | 2 | 3 | 2 | 3 | 4 | 4 | 3 | 3 | 2 |
| IPS | 3 | 1 | 1 | 2 | 2 | 2 | 2 | 1 | 2 | 2 |
| MCP | 19 | 1 | 1 | 1 | 2 | 2 | 3 | 3 | 2 | 1 |
| NDL | 6 | 1 | 1 | 1 | 1 | 3 | 3 | 2 | 3 | 1 |
| Odesy | 6 | 2 | 2 | 2 | 2 | 4 | 3 | 4 | 3 | 2 |
| Payroll | 5 | 2 | 2 | 3 | 3 | 3 | 3 | 2 | 2 | 2 |
| PCS | 6 | 1 | 2 | 2 | 3 | 2 | 2 | 3 | 3 | 2 |
| PCS III | 4 | 2 | 2 | 2 | 3 | 2 | 3 | 2 | 3 | 2 |
| Text Editor | 4 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 1 |
| Thrift | 6 | 2 | 1 | 2 | 2 | 3 | 3 | 3 | 3 | 2 |
| Cambridge | | | | | | | | | | |
| ACF-2 | 12 | 1 | 1 | 2 | 1 | 2 | 2 | 1 | 2 | 1 |
| ASM-2 | 8 | 2 | 2 | 2 | 2 | 2 | 2 | 1 | 2 | 2 |
| Candle Corp. | | | | | | | | | | |
| Omegamon | 23 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 1 |
| Capex | | | | | | | | | | |
| Optimizer | 4 | 2 | 2 | 1 | 1 | 2 | 2 | 2 | 3 | 2 |
| Optimizer III | 10 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 1 |
| TLMS II | 6 | 3 | 1 | 3 | 3 | 3 | 3 | 3 | 3 | 2 |
| Century Analysis | | | | | | | | | | |
| Boss 3 | 10 | 2 | 1 | 2 | 2 | 2 | 2 | 1 | 2 | 2 |
| CFS Inc. | | | | | | | | | | |
| Docs | 5 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 1 |
| Cincom Systems | | | | | | | | | | |
| Environ/1 | 5 | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 3 | 2 |
| Mantis | 6 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 3 | 1 |
| Total | 54 | 2 | 2 | 2 | 2 | 3 | 2 | 2 | 3 | 2 |
| NOTE: The range of average user ratings attributed to each cluster for each characteristic is as follows: | | | | | | | | | | |
| Cluster 1: | | 3.66 to 4.00 | 3.27 to 4.00 | 3.39 to 4.00 | 3.62 to 4.00 | 3.60 to 4.00 | 3.50 to 4.00 | 3.10 to 4.00 | 3.66 to 4.00 | 3.39 to 4.00 |
| Cluster 2: | | 3.08 to 3.65 | 2.66 to 3.26 | 2.66 to 3.38 | 2.85 to 3.61 | 2.69 to 3.59 | 2.70 to 3.49 | 2.50 to 3.09 | 2.88 to 3.65 | 2.70 to 3.38 |
| Cluster 3: | | 2.50 to 3.07 | 2.00 to 2.65 | 1.66 to 2.65 | 2.00 to 2.84 | 2.14 to 2.68 | 2.00 to 2.69 | 1.60 to 2.49 | 2.00 to 2.87 | 2.14 to 2.69 |
| Cluster 4: | | Below 2.50 | Below 2.00 | Below 1.66 | Below 2.00 | Below 2.14 | Below 2.00 | Below 1.60 | Below 2.00 | Below 2.14 |

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# Users Rate Their Software

## Proprietary Software: User Ratings and Cluster Analysis

| Vendor and Package Name | No. of User Ratings Received | Mean Average User Ratings | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Reliability | Efficiency | Ease of Installation | Ease of Use | Vendor's Technical Support | | | Vendor's Maintenance | Overall Satisfaction |
| | | | | | | Trouble Shooting | Documentation | User Education | | |
| Collier Jackson Assoc. | | | | | | | | | | |
| Payroll | 3 | 3.3 | 3.0 | 2.3 | 2.3 | 3.0 | 3.3 | 2.7 | 2.7 | 3.3 |
| Computer Associates | | | | | | | | | | |
| CA-Dynam/D | 32 | 3.4 | 3.1 | 3.1 | 3.3 | 2.8 | 3.1 | 2.6 | 2.9 | 3.1 |
| CA-Dynam/T | 36 | 3.4 | 3.3 | 3.1 | 3.3 | 2.9 | 3.0 | 2.6 | 3.0 | 3.0 |
| CA-Earl | 3 | 3.7 | 3.7 | 2.7 | 3.7 | 3.3 | 3.0 | 2.0 | 3.0 | 3.3 |
| CA-Jasper | 13 | 3.2 | 2.9 | 3.1 | 3.0 | 2.5 | 3.0 | 2.5 | 2.7 | 2.9 |
| CA-Sort | 45 | 3.7 | 3.6 | 3.6 | 3.8 | 3.3 | 3.4 | 2.8 | 3.4 | 3.5 |
| Computer Concepts Inc. | | | | | | | | | | |
| Dossier | 3 | 3.7 | 3.3 | 3.3 | 3.3 | 3.0 | 3.0 | 2.0 | 3.0 | 3.3 |
| Computer Corp. of America | | | | | | | | | | |
| Model 204 | 6 | 3.2 | 3.6 | 3.3 | 3.4 | 2.2 | 2.6 | 2.6 | 2.6 | 2.8 |
| Computeristics | | | | | | | | | | |
| Accounts Receivable | 3 | 3.0 | 3.0 | 2.3 | 3.3 | 2.3 | 2.7 | 2.3 | 2.3 | 2.7 |
| Compuware | | | | | | | | | | |
| Abend-Aid | 4 | 3.8 | 3.3 | 3.3 | 3.5 | 3.0 | 3.0 | 3.0 | 3.0 | 3.3 |
| Comserv | | | | | | | | | | |
| Amaps | 7 | 3.9 | 2.9 | 3.0 | 3.1 | 3.1 | 3.3 | 3.2 | 3.0 | 3.3 |
| The Continuum Company | | | | | | | | | | |
| Life 70 | 5 | 3.0 | 2.4 | 2.0 | 3.4 | 2.8 | 2.8 | 3.0 | 2.4 | 3.0 |
| Cullinane Corp. | | | | | | | | | | |
| Cars | 5 | 3.2 | 2.6 | 2.8 | 3.2 | 3.2 | 2.6 | 3.0 | 2.5 | 3.0 |
| Culprit | 3 | 3.7 | 3.3 | 3.7 | 3.7 | 3.0 | 3.3 | 3.3 | 3.0 | 3.3 |
| IDD | 4 | 3.7 | 3.0 | 4.0 | 3.3 | 3.3 | 3.3 | 3.0 | 3.3 | 3.8 |
| IDMS | 52 | 3.6 | 3.2 | 3.3 | 3.2 | 3.3 | 3.1 | 3.3 | 3.2 | 3.3 |
| IDMS-DC | 5 | 2.6 | 2.0 | 2.6 | 2.8 | 1.8 | 2.0 | 3.2 | 2.2 | 2.4 |
| Interact | 6 | 3.3 | 3.7 | 3.5 | 3.8 | 3.2 | 3.0 | 2.7 | 3.2 | 3.4 |
| Cyborg Systems Inc. | | | | | | | | | | |
| Payroll | 10 | 2.5 | 2.3 | 2.1 | 2.5 | 2.5 | 2.3 | 2.4 | 2.4 | 2.4 |
| Data Design Assoc. | | | | | | | | | | |
| Fixed Assets | 9 | 3.4 | 2.4 | 3.1 | 3.0 | 3.3 | 3.1 | 2.9 | 3.4 | 2.9 |
| Data General Corp. | | | | | | | | | | |
| AOS | 13 | 3.4 | 3.1 | 3.3 | 3.4 | 2.5 | 2.6 | 2.8 | 2.6 | 3.1 |
| INFOS | 6 | 3.2 | 2.7 | 2.7 | 2.8 | 2.2 | 2.3 | 2.3 | 2.5 | 2.5 |
| RDOS | 3 | 2.7 | 2.0 | 2.7 | 2.5 | 2.0 | 2.0 | 1.5 | 1.5 | 2.3 |
| Data Processing Design | | | | | | | | | | |
| Word II | 13 | 3.7 | 3.5 | 3.5 | 3.7 | 2.8 | 3.0 | 2.5 | 3.1 | 3.5 |
| Digital Equipment Corp. | | | | | | | | | | |
| Basic | 6 | 3.8 | 2.5 | 3.5 | 3.0 | 3.5 | 3.2 | 2.8 | 3.3 | 3.3 |
| Cobol | 4 | 4.0 | 3.8 | 4.0 | 3.8 | 2.5 | 3.3 | 2.8 | 2.5 | 3.5 |
| Datatrieve | 21 | 3.5 | 2.8 | 3.5 | 3.5 | 2.5 | 3.0 | 2.4 | 3.1 | 3.3 |

LEGEND: Mean average user ratings for each package, as tabulated above, were calculated on a scale of 4 for each user rating of Excellent, 3 for Good, 2 for Fair, and 1 for Poor.

Separate cluster analyses were then made of the mean average user ratings for all packages rated by three or more respondents. These cluster analyses were used to determine the ranges of mean average user ratings which can be interpreted as being in the highest cluster, the second, the third, and the fourth or lowest cluster for each characteristic. The mean averages which fall into each cluster group for each characteristic are listed at the bottom of the facing page. The resulting hierarchical cluster groupings for each package are tabulated on the facing page.

REPRODUCED WITH PERMISSION

| Vendor and Package Name | No. of User Ratings Received | Hierarchical Cluster Groupings | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Reliability | Efficiency | Ease of Installation | Ease of Use | Vendor's Technical Support | | | Vendor's Maintenance | Overall Satisfaction |
| | | | | | | Trouble Shooting | Documentation | User Education | | |
| Collier Jackson Assoc. | | | | | | | | | | |
| Payroll | 3 | 2 | 2 | 3 | 3 | 2 | 2 | 2 | 3 | 2 |
| Computer Associates | | | | | | | | | | |
| CA-Dynam/D | 32 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| CA-Dynam/T | 36 | 2 | 1 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| CA-Earl | 3 | 1 | 1 | 2 | 1 | 2 | 2 | 3 | 2 | 2 |
| CA-Jasper | 13 | 2 | 2 | 2 | 2 | 3 | 2 | 2 | 3 | 2 |
| CA-Sort | 45 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 1 |
| Computer Concepts Inc. | | | | | | | | | | |
| Dossier | 3 | 1 | 1 | 2 | 2 | 2 | 2 | 3 | 2 | 2 |
| Computer Corp. of America | | | | | | | | | | |
| Model 204 | 6 | 2 | 1 | 2 | 2 | 3 | 3 | 2 | 3 | 2 |
| Computeristics | | | | | | | | | | |
| Accounts Receivable | 3 | 3 | 2 | 3 | 2 | 3 | 2 | 3 | 3 | 2 |
| Compuware | | | | | | | | | | |
| Abend-Aid | 4 | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Comserv | | | | | | | | | | |
| Amaps | 7 | 1 | 2 | 2 | 2 | 2 | 2 | 1 | 2 | 2 |
| The Continuum Company | | | | | | | | | | |
| Life 70 | 2 | 3 | 3 | 2 | 2 | 2 | 2 | 2 | 3 | 2 |
| Cullinane Corp. | | | | | | | | | | |
| Cars | 5 | 2 | 3 | 2 | 2 | 2 | 3 | 2 | 3 | 2 |
| Culprit | 3 | 1 | 1 | 1 | 1 | 2 | 2 | 1 | 2 | 2 |
| IDD | 4 | 1 | 2 | 1 | 2 | 2 | 2 | 2 | 2 | 1 |
| IDMS | 52 | 2 | 2 | 2 | 2 | 2 | 2 | 1 | 2 | 2 |
| IDMS-DC | 5 | 3 | 3 | 3 | 3 | 4 | 3 | 1 | 3 | 3 |
| Interact | 6 | 2 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 1 |
| Cyborg Systems Inc. | | | | | | | | | | |
| Payroll | 10 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| Data Design Assoc. | | | | | | | | | | |
| Fixed Assets | 9 | 2 | 3 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Data General Corp. | | | | | | | | | | |
| AOS | 13 | 2 | 2 | 2 | 2 | 3 | 3 | 2 | 3 | 2 |
| INFOS | 6 | 2 | 2 | 2 | 3 | 3 | 3 | 3 | 3 | 3 |
| RDOS | 3 | 3 | 3 | 2 | 3 | 4 | 3 | 4 | 4 | 3 |
| Data Processing Design | | | | | | | | | | |
| Word II | 13 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 1 |
| Digital Equipment Corp | | | | | | | | | | |
| Basic | 6 | 1 | 3 | 1 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cobol | 4 | 1 | 1 | 1 | 1 | 3 | 2 | 2 | 3 | 1 |
| Datatrieve | 21 | 2 | 2 | 1 | 2 | 3 | 2 | 3 | 2 | 2 |
| NOTE The range of average user ratings attributed to each cluster for each characteristic is as follows | | | | | | | | | | |
| Cluster 1 | | 3.66 to 4.00 | 3.27 to 4.00 | 3.39 to 4.00 | 3.62 to 4.00 | 3.60 to 4.00 | 3.50 to 4.00 | 3.10 to 4.00 | 3.66 to 4.00 | 3.39 to 4.00 |
| Cluster 2 | | 3.08 to 3.65 | 2.66 to 3.26 | 2.66 to 3.38 | 2.85 to 3.61 | 2.69 to 3.59 | 2.70 to 3.49 | 2.50 to 3.09 | 2.88 to 3.65 | 2.70 to 3.38 |
| Cluster 3 | | 2.50 to 3.07 | 2.00 to 2.65 | 1.66 to 2.65 | 2.00 to 2.84 | 2.14 to 2.68 | 2.00 to 2.69 | 1.60 to 2.49 | 2.00 to 2.87 | 2.14 to 2.69 |
| Cluster 4 | | Below 2.50 | Below 2.00 | Below 1.66 | Below 2.00 | Below 2.14 | Below 2.00 | Below 1.60 | Below 2.00 | Below 2.14 |

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# Users Rate Their Software

## Proprietary Software: User Ratings and Cluster Analysis

| Vendor and Package Name | No. of User Ratings Received | Mean Average User Ratings | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Vendor's Technical Support | | | | |
| | | Reliability | Efficiency | Ease of Installation | Ease of Use | Trouble Shooting | Documentation | User Education | Vendor's Maintenance | Overall Satisfaction |
| Digital Equipment Corp. (continued) | | | | | | | | | | |
| DBMS | 4 | 3.0 | 2.5 | 2.8 | 2.8 | 2.0 | 2.8 | 2.8 | 3.0 | 2.8 |
| DECNet | 6 | 2.5 | 2.3 | 2.5 | 2.3 | 1.5 | 2.7 | 2.2 | 1.8 | 2.5 |
| DMS-11 | 3 | 3.7 | 3.0 | 3.5 | 3.0 | 3.3 | 3.7 | 3.3 | 3.7 | 3.7 |
| FMS-11 | 6 | 3.5 | 3.3 | 3.0 | 2.3 | 2.8 | 2.8 | 2.5 | 2.8 | 3.3 |
| Fortran | 13 | 3.7 | 3.4 | 3.8 | 3.5 | 2.8 | 3.2 | 2.8 | 3.2 | 3.3 |
| Fortran IV | 3 | 3.7 | 2.7 | 3.7 | 2.7 | 2.0 | 2.7 | 2.0 | 2.3 | 2.7 |
| General Ledger | 4 | 3.0 | 3.0 | 3.0 | 2.8 | 2.3 | 2.0 | 2.5 | 2.3 | 2.5 |
| IAS | 3 | 3.3 | 3.3 | 3.3 | 3.0 | 2.0 | 2.3 | 2.0 | 2.0 | 3.3 |
| OS8 | 3 | 3.5 | 3.5 | 4.0 | 3.5 | 3.0 | 3.5 | 3.5 | 3.0 | 3.5 |
| RSTS/E | 17 | 3.8 | 3.1 | 3.4 | 3.5 | 2.9 | 2.9 | 2.8 | 2.9 | 3.3 |
| RSX-11M | 19 | 3.5 | 3.1 | 2.9 | 3.1 | 2.5 | 2.6 | 2.7 | 2.4 | 3.2 |
| TOPS-10 | 3 | 3.3 | 3.3 | 2.7 | 4.0 | 2.5 | 2.7 | 3.5 | 2.7 | 3.3 |
| VAX-VMS | 8 | 3.8 | 3.4 | 3.8 | 3.5 | 3.3 | 3.0 | 3.1 | 3.3 | 3.6 |
| WISE | 3 | 2.7 | 2.3 | 2.7 | 2.7 | 2.0 | 2.3 | 2.3 | 2.0 | 2.3 |
| Word Processing | 4 | 3.5 | 3.5 | 3.8 | 3.8 | 3.0 | 3.0 | 2.0 | 3.0 | 3.5 |
| Digital Research | | | | | | | | | | |
| CP/M | 24 | 3.5 | 3.0 | 3.0 | 3.3 | 2.6 | 2.5 | 2.4 | 2.7 | 3.2 |
| PL/I-80 | 3 | 3.7 | 3.0 | 4.0 | 3.7 | 3.0 | 3.0 | 3.0 | 3.3 | 3.7 |
| Dylakor Software Systems | | | | | | | | | | |
| DYL-260 | 26 | 3.8 | 3.7 | 3.7 | 3.4 | 3.3 | 3.3 | 3.0 | 3.6 | 3.6 |
| Electronic Data Systems | | | | | | | | | | |
| Club Management | 7 | 3.0 | 2.7 | 2.1 | 3.0 | 2.7 | 2.4 | 2.2 | 2.7 | 2.9 |
| EPS Consultants | | | | | | | | | | |
| FCS-EPS | 4 | 3.5 | 3.3 | 4.0 | 3.5 | 3.3 | 2.0 | 3.0 | 2.5 | 3.3 |
| Execucom Systems Corp. | | | | | | | | | | |
| IFPS | 18 | 3.7 | 3.2 | 3.5 | 3.6 | 3.0 | 3.1 | 3.1 | 3.0 | 3.3 |
| Finar System | | | | | | | | | | |
| Finar | 3 | 3.5 | 3.3 | 3.7 | 3.7 | 3.0 | 3.3 | 3.0 | 2.5 | 3.7 |
| Florida Software | | | | | | | | | | |
| Commercial Loan | 4 | 3.5 | 2.3 | 2.5 | 2.8 | 2.5 | 3.3 | 3.0 | 2.5 | 3.0 |
| CIF | 5 | 3.6 | 2.8 | 2.6 | 3.0 | 2.8 | 3.4 | 2.6 | 2.8 | 3.0 |
| Demand Deposit | 13 | 3.2 | 2.5 | 2.3 | 3.0 | 2.5 | 3.6 | 2.8 | 2.7 | 3.0 |
| Financial Mgmt. | 3 | 3.3 | 2.3 | 2.0 | 2.3 | 2.3 | 3.0 | 2.3 | 2.0 | 2.3 |
| Installment Loan | 3 | 3.0 | 2.0 | 2.0 | 2.3 | 2.0 | 3.3 | 2.7 | 2.3 | 2.7 |
| Mortgage Loan | 6 | 2.5 | 2.0 | 2.3 | 2.7 | 1.7 | 2.5 | 2.6 | 1.8 | 2.3 |
| Saving System | 4 | 3.5 | 3.0 | 3.3 | 3.5 | 3.0 | 3.8 | 2.8 | 3.0 | 3.5 |
| Fortex Data Corp. | | | | | | | | | | |
| Accounts Receivable | 5 | 2.8 | 2.4 | 2.4 | 2.8 | 1.8 | 2.2 | 2.4 | 2.4 | 2.6 |
| C-Arms | 4 | 3.0 | 3.3 | 2.5 | 3.0 | 1.8 | 2.3 | 2.3 | 2.0 | 2.5 |
| Four Phase | | | | | | | | | | |
| Vision | 3 | 3.7 | 3.3 | 3.3 | 2.7 | 3.3 | 2.7 | 3.3 | 3.3 | 3.3 |
| Generic Systems | | | | | | | | | | |
| DRD | 3 | 3.3 | 3.7 | 3.3 | 3.7 | 2.3 | 3.3 | 3.0 | 2.3 | 3.3 |

LEGEND: Mean average user ratings for each package, as tabulated above, were calculated on a scale of 4 for each user rating of Excellent, 3 for Good, 2 for Fair, and 1 for Poor.

Separate cluster analyses were then made of the mean average user ratings for all packages rated by three or more respondents These cluster analyses were used to determine the ranges of mean average user ratings which can be interpreted as being in the highest cluster the second, the third, and the fourth or lowest cluster for each characteristic The mean averages which fall into each cluster group for each characteristic are listed at the bottom of the facing page The resulting hierarchical cluster groupings for each package are tabulated on the facing page

REPRODUCED WITH PERMISSION

| Vendor and Package Name | No. of User Ratings Received | Hierarchical Cluster Groupings | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Vendor's Technical Support | | | | |
| | | Reliability | Efficiency | Ease of Installation | Ease of Use | Trouble Shooting | Documentation | User Education | Vendor's Maintenance | Overall Satisfaction |
| Digital Equipment Corp. (continued) | | | | | | | | | | |
| DBMS | 4 | 3 | 3 | 2 | 3 | 4 | 2 | 2 | 2 | 2 |
| DECNet | 6 | 3 | 3 | 3 | 3 | 4 | 2 | 3 | 4 | 3 |
| DMS-11 | 3 | 1 | 2 | 1 | 2 | 2 | 1 | 1 | 1 | 1 |
| FMS-11 | 6 | 2 | 1 | 2 | 3 | 2 | 2 | 2 | 3 | 2 |
| Fortran | 13 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 2 |
| Fortran IV | 3 | 1 | 2 | 1 | 3 | 4 | 2 | 3 | 3 | 2 |
| General Ledger | 4 | 3 | 2 | 2 | 3 | 3 | 3 | 2 | 3 | 3 |
| IAS | 3 | 2 | 1 | 2 | 2 | 4 | 3 | 3 | 3 | 2 |
| OS8 | 3 | 2 | 1 | 1 | 2 | 2 | 1 | 1 | 2 | 1 |
| RSTS/E | 17 | 1 | 2 | 1 | 2 | 2 | 2 | 2 | 2 | 2 |
| RSX-11M | 19 | 2 | 2 | 2 | 2 | 3 | 3 | 2 | 3 | 2 |
| TOPS-10 | 3 | 2 | 1 | 2 | 1 | 3 | 2 | 1 | 3 | 2 |
| VAX-VMS | 8 | 1 | 1 | 1 | 2 | 2 | 2 | 1 | 2 | 1 |
| WISE | 3 | 3 | 3 | 2 | 3 | 4 | 3 | 3 | 3 | 3 |
| Word Processing | 4 | 2 | 1 | 1 | 1 | 2 | 2 | 3 | 2 | 1 |
| Digital Research | | | | | | | | | | |
| CP/M | 24 | 2 | 2 | 2 | 2 | 3 | 3 | 3 | 3 | 2 |
| PL/I-80 | 3 | 1 | 2 | 1 | 1 | 2 | 2 | 2 | 2 | 1 |
| Dylakor Software Systems | | | | | | | | | | |
| DYL-260 | 26 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 1 |
| Electronic Data Systems | | | | | | | | | | |
| Club Management | 7 | 3 | 2 | 3 | 2 | 2 | 3 | 3 | 3 | 2 |
| EPS Consultants | | | | | | | | | | |
| FCS-EPS | 4 | 2 | 1 | 1 | 2 | 2 | 3 | 2 | 3 | 2 |
| Execucom Systems Corp. | | | | | | | | | | |
| IFPS | 18 | 1 | 2 | 1 | 2 | 2 | 2 | 1 | 2 | 2 |
| Finar System | | | | | | | | | | |
| Finar | 3 | 2 | 1 | 1 | 1 | 2 | 2 | 2 | 3 | 1 |
| Florida Software | | | | | | | | | | |
| Commercial Loan | 4 | 2 | 3 | 3 | 3 | 3 | 2 | 2 | 3 | 2 |
| CIF | 5 | 2 | 2 | 3 | 2 | 2 | 2 | 2 | 3 | 2 |
| Demand Deposit | 13 | 2 | 3 | 3 | 2 | 3 | 1 | 2 | 3 | 2 |
| Financial Mgmt. | 3 | 2 | 3 | 3 | 3 | 3 | 2 | 3 | 3 | 3 |
| Installment Loan | 3 | 3 | 3 | 3 | 3 | 4 | 2 | 2 | 3 | 2 |
| Mortgage Loan | 6 | 3 | 3 | 3 | 3 | 4 | 3 | 2 | 4 | 3 |
| Saving System | 4 | 2 | 2 | 2 | 2 | 2 | 1 | 2 | 2 | 1 |
| Fortex Data Corp. | | | | | | | | | | |
| Accounts Receivable | 5 | 3 | 3 | 3 | 3 | 4 | 3 | 3 | 3 | 3 |
| C-Arms | 4 | 3 | 1 | 3 | 2 | 4 | 3 | 3 | 3 | 3 |
| Four Phase | | | | | | | | | | |
| Vision | 3 | 1 | 1 | 2 | 3 | 2 | 2 | 1 | 2 | 2 |
| Generic Systems | | | | | | | | | | |
| DRD | 3 | 2 | 1 | 2 | 1 | 3 | 2 | 2 | 3 | 2 |
| NOTE The range of average user ratings attributed to each cluster for each characteristic is as follows: | | | | | | | | | | |
| Cluster 1: | | 3.66 to 4.00 | 3.27 to 4.00 | 3.39 to 4.00 | 3.62 to 4.00 | 3.60 to 4.00 | 3.50 to 4.00 | 3.10 to 4.00 | 3.66 to 4.00 | 3.39 to 4.00 |
| Cluster 2: | | 3.08 to 3.65 | 2.66 to 3.26 | 2.66 to 3.38 | 2.85 to 3.61 | 2.69 to 3.59 | 2.70 to 3.49 | 2.50 to 3.09 | 2.88 to 3.65 | 2.70 to 3.38 |
| Cluster 3: | | 2.50 to 3.07 | 2.00 to 2.65 | 1.66 to 2.65 | 2.00 to 2.84 | 2.14 to 2.68 | 2.00 to 2.69 | 1.60 to 2.49 | 2.00 to 2.87 | 2.14 to 2.69 |
| Cluster 4: | | Below 2.50 | Below 2.00 | Below 1.66 | Below 2.00 | Below 2.14 | Below 2.00 | Below 1.60 | Below 2.00 | Below 2.14 |

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# Users Rate Their Software

## Proprietary Software: User Ratings and Cluster Analysis

| Vendor and Package Name | No. of User Ratings Received | Mean Average User Ratings | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Reliability | Efficiency | Ease of Installation | Ease of Use | Vendor's Technical Support: Trouble Shooting | Vendor's Technical Support: Documentation | Vendor's Technical Support: User Education | Vendor's Maintenance | Overall Satisfaction |
| Goal Systems | | | | | | | | | | |
| FAQS/FTL | 8 | 3.9 | 3.8 | 3.6 | 3.9 | 3.3 | 3.4 | 2.8 | 3.3 | 3.6 |
| Faver | 4 | 3.8 | 3.8 | 4.0 | 4.0 | 4.0 | 3.3 | 3.5 | 3.5 | 4.0 |
| Flee/Flim | 7 | 3.9 | 3.9 | 3.7 | 3.7 | 3.7 | 3.6 | 3.3 | 3.8 | 3.9 |
| Harris | | | | | | | | | | |
| Accounts Payable | 3 | 3.7 | 3.0 | 3.7 | 3.7 | 2.7 | 3.3 | 3.0 | 3.0 | 3.7 |
| Henco, Inc. | | | | | | | | | | |
| Info | 13 | 3.2 | 2.8 | 3.6 | 3.7 | 3.0 | 2.5 | 2.6 | 2.9 | 3.3 |
| Hewlett-Packard Co | | | | | | | | | | |
| Cobol | 4 | 3.5 | 3.0 | 3.3 | 3.5 | 3.3 | 3.0 | 3.0 | 3.3 | 3.5 |
| Image/1000 | 4 | 3.5 | 3.0 | 3.0 | 3.8 | 3.0 | 2.8 | 2.8 | 3.0 | 3.0 |
| Image/3000 | 27 | 3.7 | 3.1 | 3.6 | 3.5 | 3.0 | 2.9 | 2.8 | 3.3 | 3.4 |
| MFG/3000 | 8 | 3.6 | 3.3 | 3.6 | 3.5 | 2.8 | 3.0 | 3.1 | 3.4 | 3.4 |
| TDP/3000 | 3 | 3.7 | 2.7 | 4.0 | 3.3 | 2.3 | 2.3 | 2.5 | 3.0 | 3.0 |
| VIEW/3000 | 4 | 4.0 | 2.8 | 3.5 | 3.8 | 2.8 | 2.8 | 3.0 | 2.8 | 3.0 |
| Honeywell Info Systems | | | | | | | | | | |
| DEF II | 3 | 3.7 | 3.0 | 3.0 | 2.7 | 3.0 | 2.0 | 2.0 | 3.0 | 2.7 |
| DM-IV | 6 | 3.0 | 2.7 | 2.8 | 3.0 | 2.2 | 1.8 | 3.0 | 2.2 | 2.8 |
| General Ledger | 4 | 3.0 | 2.3 | 2.0 | 2.3 | 2.3 | 2.0 | 1.7 | 2.0 | 2.3 |
| GCOS | 11 | 3.4 | 3.3 | 2.7 | 3.4 | 2.5 | 2.7 | 2.6 | 2.7 | 3.1 |
| Gerts II | 4 | 3.0 | 3.3 | 2.8 | 3.3 | 2.8 | 2.8 | 2.7 | 2.5 | 2.8 |
| Mfg System | 3 | 2.7 | 3.0 | 3.3 | 2.7 | 2.7 | 2.7 | 1.0 | 2.7 | 2.3 |
| TDS | 6 | 3.5 | 3.2 | 3.3 | 3.3 | 3.0 | 2.7 | 3.0 | 3.2 | 3.0 |
| TPS | 5 | 3.0 | 2.8 | 3.2 | 3.0 | 3.2 | 2.0 | 1.8 | 3.4 | 3.0 |
| IBM Corp | | | | | | | | | | |
| Accounts Payable | 12 | 2.9 | 2.5 | 3.2 | 2.6 | 2.9 | 3.2 | 2.9 | 2.7 | 2.8 |
| Accounts Receivable | 10 | 3.3 | 3.2 | 3.1 | 3.1 | 2.7 | 2.8 | 2.8 | 2.8 | 3.0 |
| Accounting | 4 | 3.0 | 3.0 | 2.8 | 3.0 | 2.5 | 3.0 | 2.5 | 2.5 | 3.0 |
| ACF-2 | 5 | 3.4 | 2.8 | 2.2 | 3.2 | 2.6 | 2.6 | 1.8 | 2.5 | 2.8 |
| ACF/NCP | 3 | 3.3 | 3.0 | 2.7 | 3.0 | 2.7 | 2.3 | 3.3 | 3.0 | 3.0 |
| ACF VTAM | 3 | 3.3 | 3.3 | 3.0 | 3.0 | 3.0 | 2.7 | 3.0 | 3.3 | 3.3 |
| ADF | 4 | 3.3 | 3.0 | 3.0 | 3.0 | 3.7 | 2.7 | 2.7 | 3.3 | 3.0 |
| ADRS | 3 | 3.3 | 1.7 | 2.3 | 3.0 | 1.7 | 2.3 | 2.0 | 2.3 | 2.7 |
| APL | 4 | 3.0 | 2.5 | 2.5 | 2.5 | 2.3 | 2.3 | 2.8 | 2.5 | 2.5 |
| ATMS | 3 | 3.7 | 3.3 | 3.5 | 3.0 | 3.3 | 2.3 | 2.3 | 2.5 | 3.0 |
| ATMS-III | 4 | 3.5 | 2.8 | 2.3 | 2.3 | 2.8 | 2.3 | 1.8 | 2.5 | 2.8 |
| BOMP | 15 | 3.5 | 3.1 | 2.8 | 2.9 | 2.7 | 3.1 | 2.6 | 2.5 | 3.2 |
| CICS | 171 | 3.3 | 2.9 | 2.5 | 2.8 | 2.9 | 2.9 | 2.7 | 2.9 | 3.0 |
| CMAS | 11 | 2.7 | 2.3 | 2.7 | 2.3 | 2.4 | 2.9 | 2.3 | 2.5 | 2.4 |
| CMS | 10 | 3.6 | 3.3 | 3.0 | 3.2 | 2.8 | 3.1 | 2.7 | 3.0 | 3.0 |
| Cobol | 17 | 3.5 | 3.0 | 3.3 | 3.1 | 2.9 | 2.6 | 2.5 | 3.1 | 3.1 |
| Copics | 10 | 3.1 | 2.6 | 3.0 | 2.9 | 2.6 | 2.9 | 2.4 | 2.9 | 2.9 |
| CPF | 5 | 3.6 | 3.2 | 3.0 | 2.6 | 3.0 | 2.4 | 2.6 | 3.0 | 3.0 |
| Data Comp | 3 | 3.7 | 3.7 | 3.3 | 3.3 | 3.0 | 3.0 | 2.7 | 2.7 | 3.0 |
| Data Dictionary | 5 | 3.4 | 2.4 | 2.8 | 2.4 | 2.8 | 3.2 | 2.0 | 3.5 | 3.3 |
| Data File Utility | 3 | 4.0 | 3.3 | 4.0 | 3.3 | 3.7 | 3.0 | 3.3 | 3.7 | 3.3 |
| DCF | 4 | 3.0 | 3.0 | 2.8 | 3.0 | 1.8 | 2.3 | 2.0 | 2.3 | 2.5 |
| DF/DS | 11 | 3.4 | 2.9 | 3.2 | 3.0 | 3.3 | 3.4 | 2.9 | 3.2 | 3.1 |
| DL-1 | 8 | 3.4 | 2.5 | 2.9 | 2.9 | 3.3 | 2.6 | 2.9 | 3.3 | 3.3 |

LEGEND. Mean average user ratings for each package, as tabulated above, were calculated on a scale of 4 for each user rating of Excellent, 3 for Good, 2 for Fair, and 1 for Poor

Separate cluster analyses were then made of the mean average user ratings for all packages rated by three or more respondents. These cluster analyses were used to determine the ranges of mean average user ratings which can be interpreted as being in the highest cluster, the second, the third, and the fourth or lowest cluster for each characteristic. The mean averages which fall into each cluster group for each characteristic are listed at the bottom of the facing page. The resulting hierarchical cluster groupings for each package are tabulated on the facing page.

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| Vendor and Package Name | No. of User Ratings Received | Hierarchical Cluster Groupings | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Reliability | Efficiency | Ease of Installation | Ease of Use | Vendor's Technical Support: Trouble Shooting | Vendor's Technical Support: Documentation | Vendor's Technical Support: User Education | Vendor's Maintenance | Overall Satisfaction |
| Goal Systems | | | | | | | | | | |
| FAQS/FTL | 8 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 1 |
| Faver | 4 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 2 | 1 |
| Flee/Flim | 7 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Harris | | | | | | | | | | |
| Accounts Payable | 3 | 1 | 2 | 1 | 1 | 2 | 2 | 2 | 2 | 1 |
| Henco, Inc. | | | | | | | | | | |
| Info | 13 | 2 | 2 | 1 | 1 | 2 | 3 | 2 | 2 | 2 |
| Hewlett-Packard Co. | | | | | | | | | | |
| Cobol | 4 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 1 |
| Image/1000 | 4 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Image/3000 | 27 | 1 | 2 | 1 | 2 | 2 | 2 | 2 | 2 | 1 |
| MFG/3000 | 8 | 2 | 1 | 1 | 2 | 2 | 2 | 1 | 2 | 1 |
| TDP/3000 | 3 | 1 | 2 | 1 | 2 | 3 | 3 | 2 | 2 | 2 |
| VIEW/3000 | 4 | 1 | 2 | 1 | 1 | 2 | 2 | 2 | 3 | 2 |
| Honeywell Info Systems | | | | | | | | | | |
| DEF II | 3 | 1 | 2 | 2 | 3 | 2 | 3 | 3 | 2 | 2 |
| DM-IV | 6 | 3 | 2 | 2 | 2 | 3 | 4 | 2 | 3 | 2 |
| General Ledger | 4 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| GCOS | 11 | 2 | 1 | 2 | 2 | 3 | 2 | 2 | 3 | 2 |
| Gerts II | 4 | 3 | 1 | 2 | 2 | 2 | 2 | 2 | 3 | 2 |
| Mfg System | 3 | 3 | 2 | 2 | 3 | 2 | 2 | 4 | 3 | 3 |
| TDS | 6 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| TPS | 5 | 3 | 2 | 2 | 2 | 2 | 3 | 3 | 2 | 2 |
| IBM Corp. | | | | | | | | | | |
| Accounts Payable | 12 | 3 | 3 | 2 | 3 | 2 | 2 | 2 | 3 | 2 |
| Accounts Receivable | 10 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 3 | 2 |
| Accounting | 4 | 3 | 2 | 2 | 2 | 3 | 2 | 2 | 3 | 2 |
| ACF-2 | 5 | 2 | 2 | 3 | 2 | 3 | 3 | 3 | 3 | 2 |
| ACF/NCP | 3 | 2 | 2 | 2 | 2 | 2 | 3 | 1 | 2 | 2 |
| ACF/VTAM | 3 | 2 | 1 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| ADF | 4 | 2 | 2 | 2 | 2 | 1 | 2 | 2 | 2 | 2 |
| ADRS | 3 | 2 | 4 | 3 | 2 | 4 | 3 | 3 | 3 | 2 |
| APL | 4 | 3 | 3 | 3 | 3 | 3 | 2 | 3 | 3 | 3 |
| ATMS | 3 | 1 | 1 | 1 | 2 | 2 | 3 | 3 | 3 | 2 |
| ATMS-III | 4 | 2 | 2 | 3 | 3 | 2 | 3 | 3 | 3 | 2 |
| BOMP | 15 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 3 | 2 |
| CICS | 117 | 2 | 2 | 3 | 3 | 2 | 2 | 2 | 2 | 2 |
| CMAS | 11 | 3 | 3 | 2 | 3 | 3 | 2 | 3 | 3 | 3 |
| CMS | 10 | 2 | 1 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cobol | 17 | 2 | 2 | 2 | 2 | 2 | 3 | 2 | 2 | 2 |
| Copics | 10 | 2 | 3 | 2 | 2 | 3 | 2 | 3 | 2 | 2 |
| CPF | 5 | 2 | 2 | 2 | 3 | 2 | 3 | 2 | 2 | 2 |
| Data Comp | 3 | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 3 | 2 |
| Data Dictionary | 5 | 2 | 3 | 2 | 3 | 2 | 2 | 3 | 2 | 2 |
| Data File Utility | 3 | 1 | 1 | 1 | 2 | 1 | 2 | 1 | 1 | 2 |
| DCF | 4 | 3 | 2 | 2 | 2 | 4 | 3 | 3 | 3 | 3 |
| DF/DS | 11 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| DL-1 | 8 | 2 | 3 | 2 | 2 | 2 | 3 | 2 | 2 | 2 |
| NOTE The range of average user ratings attributed to each cluster for each characteristic is as follows | | | | | | | | | | |
| Cluster 1 | | 3.66 to 4.00 | 3.27 to 4.00 | 3.39 to 4.00 | 3.62 to 4.00 | 3.60 to 4.00 | 3.50 to 4.00 | 3.10 to 4.00 | 3.66 to 4.00 | 3.39 to 4.00 |
| Cluster 2 | | 3.08 to 3.65 | 2.66 to 3.26 | 2.66 to 3.38 | 2.85 to 3.61 | 2.69 to 3.59 | 2.70 to 3.49 | 2.50 to 3.09 | 2.88 to 3.65 | 2.70 to 3.38 |
| Cluster 3 | | 2.50 to 3.07 | 2.00 to 2.65 | 1.66 to 2.65 | 2.00 to 2.84 | 2.14 to 2.68 | 2.00 to 2.69 | 1.60 to 2.49 | 2.00 to 2.87 | 2.14 to 2.69 |
| Cluster 4 | | Below 2.50 | Below 2.00 | Below 1.66 | Below 2.00 | Below 2.14 | Below 2.00 | Below 1.60 | Below 2.00 | Below 2.14 |

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# Users Rate Their Software

## Proprietary Software: User Ratings and Cluster Analysis

| Vendor and Package Name | No. of User Ratings Received | Mean Average User Ratings | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Reliability | Efficiency | Ease of Installation | Ease of Use | Vendor's Technical Support: Trouble Shooting | Vendor's Technical Support: Documentation | Vendor's Technical Support: User Education | Vendor's Maintenance | Overall Satisfaction |
| IBM Corp (Continued) | | | | | | | | | | |
| DMAS | 21 | 3.6 | 2.8 | 2.9 | 3.1 | 3.2 | 3.4 | 3.0 | 3.0 | 3.1 |
| DMS | 28 | 3.0 | 2.6 | 3.0 | 2.5 | 2.3 | 2.3 | 2.4 | 2.3 | 2.5 |
| DOS/VS | 19 | 3.2 | 2.9 | 2.8 | 2.9 | 3.0 | 2.9 | 2.7 | 2.9 | 3.0 |
| DOS/VSE | 12 | 3.1 | 2.8 | 2.1 | 2.6 | 2.3 | 2.4 | 2.5 | 2.2 | 2.6 |
| EPIC SOCRATES | 4 | 3.0 | 2.5 | 2.0 | 2.5 | 2.3 | 2.0 | 2.3 | 2.8 | 2.5 |
| Fixed Assets | 8 | 3.3 | 3.3 | 3.3 | 2.9 | 2.4 | 2.8 | 2.5 | 2.2 | 3.0 |
| General Ledger | 15 | 2.9 | 2.7 | 2.4 | 2.7 | 2.3 | 2.6 | 2.1 | 2.2 | 2.7 |
| Graphics | 4 | 3.5 | 3.3 | 3.0 | 3.0 | 3.0 | 2.5 | 2.3 | 3.3 | 3.3 |
| HSM | 4 | 3.5 | 3.0 | 2.5 | 3.0 | 2.5 | 2.5 | 2.5 | 3.0 | 2.5 |
| ICCF | 29 | 3.4 | 3.1 | 3.3 | 3.2 | 3.0 | 2.9 | 2.8 | 3.2 | 3.3 |
| IMS | 18 | 3.3 | 2.7 | 2.2 | 2.7 | 2.8 | 2.7 | 2.9 | 3.1 | 3.1 |
| IMS/DC | 4 | 3.3 | 2.8 | 3.0 | 3.3 | 2.5 | 3.8 | 2.8 | 2.8 | 3.5 |
| IMS/VS | 55 | 3.4 | 2.6 | 2.5 | 2.4 | 2.8 | 2.8 | 2.6 | 2.9 | 2.8 |
| Inventory | 4 | 3.5 | 3.0 | 3.0 | 3.3 | 3.0 | 3.5 | 3.3 | 3.3 | 3.0 |
| Ipics | 14 | 2.6 | 2.6 | 2.1 | 2.2 | 2.4 | 2.3 | 2.3 | 2.4 | 2.4 |
| Mapics | 90 | 3.4 | 2.7 | 2.9 | 2.9 | 2.9 | 3.1 | 2.8 | 3.1 | 2.9 |
| MMAS | 10 | 3.4 | 2.6 | 3.0 | 2.9 | 2.9 | 3.5 | 2.8 | 3.1 | 2.8 |
| MVS | 25 | 3.6 | 3.3 | 3.0 | 3.2 | 3.3 | 3.1 | 3.0 | 3.2 | 3.3 |
| MVS/SP | 6 | 3.7 | 3.5 | 2.7 | 3.5 | 3.2 | 2.8 | 3.0 | 3.3 | 3.3 |
| NCFF | 4 | 3.8 | 3.3 | 3.0 | 3.3 | 3.0 | 3.0 | 2.5 | 2.8 | 3.0 |
| NPDA | 3 | 3.3 | 3.0 | 2.7 | 3.3 | 2.3 | 2.7 | 2.7 | 3.3 | 3.3 |
| OS | 12 | 3.7 | 3.3 | 3.2 | 3.3 | 3.2 | 2.8 | 3.2 | 3.2 | 3.3 |
| OS/VS 1 | 3 | 4.0 | 2.7 | 3.0 | 2.7 | 3.3 | 2.7 | 2.3 | 3.7 | 3.0 |
| Patient Care | 3 | 3.0 | 3.3 | 2.3 | 3.3 | 2.3 | 2.3 | 2.3 | 2.7 | 3.0 |
| Payroll | 12 | 3.0 | 2.5 | 2.3 | 2.5 | 2.2 | 2.6 | 2.4 | 2.5 | 2.5 |
| PL/1 Optimizer | 3 | 3.3 | 3.3 | 2.3 | 3.3 | 2.5 | 2.3 | 2.5 | 3.0 | 3.3 |
| Plan code | 3 | 3.3 | 2.3 | 2.7 | 2.7 | 2.3 | 2.0 | 3.0 | 2.3 | 3.0 |
| PMS-4 | 3 | 3.7 | 2.7 | 2.7 | 2.3 | 2.3 | 2.3 | 2.0 | 3.0 | 2.7 |
| Power | 4 | 3.5 | 3.5 | 3.3 | 3.5 | 3.0 | 2.5 | 3.3 | 3.5 | 3.3 |
| QBE | 3 | 3.3 | 2.7 | 2.0 | 3.3 | 2.3 | 2.7 | 2.3 | 3.0 | 3.0 |
| RACF | 8 | 3.1 | 2.9 | 2.0 | 2.3 | 2.5 | 2.1 | 1.9 | 2.9 | 2.5 |
| RPG | 18 | 3.6 | 3.3 | 3.6 | 3.4 | 3.0 | 3.3 | 2.7 | 3.2 | 3.4 |
| RPG-II | 3 | 3.7 | 3.7 | 4.0 | 4.0 | 3.7 | 3.7 | 3.3 | 3.3 | 3.7 |
| SC21 | 3 | 4.0 | 3.0 | 4.0 | 4.0 | 4.0 | 3.0 | 2.7 | 4.0 | 3.7 |
| SCP | 5 | 3.5 | 3.5 | 3.3 | 3.3 | 3.2 | 3.4 | 2.2 | 3.0 | 3.2 |
| SDF | 3 | 3.7 | 3.7 | 3.0 | 3.3 | 3.0 | 3.5 | 2.5 | 3.0 | 3.7 |
| Sort | 13 | 3.6 | 3.0 | 3.5 | 3.5 | 3.4 | 3.2 | 3.2 | 3.3 | 3.2 |
| Source Entry | 3 | 3.7 | 3.7 | 3.7 | 3.7 | 3.7 | 3.7 | 3.7 | 3.7 | 3.7 |
| Source Library | 3 | 4.0 | 3.3 | 3.0 | 3.7 | 2.7 | 3.3 | 3.0 | 2.7 | 3.3 |
| Source Maint | 3 | 4.0 | 3.3 | 3.7 | 3.7 | 3.0 | 3.0 | 3.0 | 3.3 | 3.7 |
| SPF | 18 | 3.8 | 3.4 | 3.2 | 3.8 | 2.9 | 2.9 | 2.5 | 3.3 | 3.6 |
| SSP | 7 | 3.7 | 3.3 | 3.6 | 3.6 | 3.7 | 3.6 | 3.7 | 3.6 | 3.6 |
| TSO | 16 | 3.7 | 2.9 | 2.8 | 3.3 | 3.1 | 3.1 | 2.7 | 3.2 | 3.2 |
| TSO/SPF | 18 | 3.4 | 2.8 | 2.8 | 3.4 | 3.1 | 2.8 | 2.7 | 3.1 | 3.0 |
| Utilities | 5 | 4.0 | 3.6 | 4.0 | 3.4 | 3.6 | 2.8 | 3.0 | 3.6 | 3.4 |
| VM | 27 | 3.5 | 3.2 | 3.1 | 3.4 | 3.3 | 3.0 | 2.5 | 3.1 | 3.2 |
| VSAM | 7 | 2.9 | 2.4 | 3.0 | 2.4 | 2.4 | 2.3 | 2.0 | 2.4 | 2.4 |
| VSPC | 4 | 3.5 | 3.0 | 2.7 | 3.3 | 3.0 | 2.8 | 2.5 | 3.3 | 3.0 |
| Word Processing | 4 | 3.0 | 3.3 | 3.3 | 3.0 | 3.3 | 3.8 | 3.0 | 3.5 | 3.5 |
| WSF/34 | 3 | 3.7 | 3.7 | 3.7 | 4.0 | 2.5 | 3.0 | 2.5 | 2.5 | 3.5 |
| Infodata Systems | | | | | | | | | | |
| Inquire | 6 | 3.0 | 2.6 | 3.3 | 3.4 | 2.6 | 2.3 | 3.2 | 2.8 | 3.2 |

LEGEND: Mean average user ratings for each package, as tabulated above, were calculated on a scale of 4 for each user rating of Excellent, 3 for Good, 2 for Fair, and 1 for Poor.

Separate cluster analyses were then made of the mean average user ratings for all packages rated by three or more respondents. These cluster analyses were used to determine the ranges of mean average user ratings which can be interpreted as being in the highest cluster, the second, the third, and the fourth or lowest cluster for each characteristic. The mean averages which fall into each cluster group for each characteristic are listed at the bottom of the facing page. The resulting hierarchical cluster groupings for each package are tabulated on the facing page.

**REPRODUCED WITH PERMISSION**

| Vendor and Package Name | No. of User Ratings Received | Hierarchical Cluster Groupings | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Reliability | Efficiency | Ease of Installation | Ease of Use | Vendor's Technical Support: Trouble Shooting | Vendor's Technical Support: Documentation | Vendor's Technical Support: User Education | Vendor's Maintenance | Overall Satisfaction |
| IBM Corp (Continued) | | | | | | | | | | |
| DMAS | 21 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| DMS | 28 | 3 | 3 | 2 | 3 | 3 | 3 | 3 | 3 | 3 |
| DOS/VS | 19 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| DOS/VSE | 12 | 2 | 2 | 3 | 3 | 3 | 3 | 2 | 3 | 3 |
| EPIC SOCRATES | 4 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| Fixed Assets | 8 | 2 | 1 | 2 | 2 | 3 | 2 | 2 | 3 | 2 |
| General Ledger | 15 | 3 | 2 | 3 | 3 | 3 | 3 | 3 | 3 | 2 |
| Graphics | 4 | 2 | 1 | 2 | 2 | 2 | 3 | 3 | 2 | 2 |
| HSM | 4 | 2 | 3 | 2 | 2 | 3 | 3 | 2 | 2 | 3 |
| ICCF | 29 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| IMS | 18 | 2 | 2 | 3 | 3 | 2 | 2 | 2 | 2 | 2 |
| IMS/DC | 4 | 2 | 2 | 2 | 2 | 3 | 1 | 2 | 3 | 1 |
| IMS/VS | 55 | 2 | 3 | 3 | 3 | 2 | 2 | 2 | 2 | 2 |
| Inventory | 4 | 2 | 2 | 2 | 2 | 2 | 1 | 1 | 2 | 2 |
| Ipics | 14 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| Mapics | 90 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| MMAS | 10 | 2 | 3 | 2 | 2 | 2 | 1 | 2 | 2 | 2 |
| MVS | 25 | 2 | 1 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| MVS/SP | 6 | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| NCFF | 4 | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 3 | 2 |
| NPDA | 3 | 2 | 2 | 2 | 2 | 3 | 2 | 2 | 2 | 2 |
| OS | 12 | 1 | 1 | 2 | 2 | 2 | 2 | 1 | 2 | 2 |
| OS/VS 1 | 3 | 1 | 2 | 2 | 3 | 2 | 2 | 3 | 1 | 2 |
| Patient Care | 3 | 3 | 1 | 3 | 2 | 3 | 3 | 3 | 3 | 2 |
| Payroll | 12 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| PL/1 Optimizer | 3 | 2 | 1 | 3 | 2 | 3 | 3 | 2 | 2 | 2 |
| Plan code | 3 | 2 | 3 | 2 | 3 | 3 | 3 | 2 | 3 | 2 |
| PMS-4 | 3 | 1 | 2 | 2 | 3 | 3 | 3 | 3 | 2 | 2 |
| Power | 4 | 2 | 1 | 2 | 2 | 2 | 3 | 1 | 2 | 2 |
| QBE | 3 | 2 | 2 | 3 | 2 | 3 | 2 | 3 | 2 | 2 |
| RACF | 8 | 2 | 2 | 3 | 3 | 3 | 3 | 3 | 2 | 3 |
| RPG | 18 | 2 | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 1 |
| RPG-II | 3 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 1 |
| SC21 | 3 | 1 | 2 | 1 | 1 | 1 | 2 | 2 | 1 | 1 |
| SCP | 5 | 2 | 1 | 2 | 2 | 2 | 3 | 3 | 2 | 2 |
| SDF | 3 | 1 | 1 | 2 | 2 | 2 | 1 | 2 | 2 | 1 |
| Sort | 13 | 2 | 2 | 1 | 2 | 2 | 2 | 1 | 2 | 2 |
| Source Entry | 3 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Source Library | 3 | 1 | 1 | 2 | 1 | 2 | 2 | 2 | 3 | 2 |
| Source Maint | 3 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 1 |
| SPF | 18 | 1 | 1 | 2 | 1 | 2 | 2 | 2 | 2 | 1 |
| SSP | 7 | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 2 | 1 |
| TSO | 16 | 1 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| TSO/SPF | 18 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Utilities | 5 | 1 | 1 | 1 | 2 | 1 | 2 | 2 | 2 | 1 |
| VM | 27 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| VSAM | 7 | 3 | 3 | 2 | 3 | 3 | 3 | 3 | 3 | 3 |
| VSPC | 4 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Word Processing | 4 | 3 | 1 | 2 | 2 | 2 | 1 | 2 | 2 | 1 |
| WSF/34 | 3 | 1 | 1 | 1 | 1 | 3 | 2 | 2 | 3 | 1 |
| Infodata Systems | | | | | | | | | | |
| Inquire | 6 | 3 | 3 | 2 | 2 | 3 | 3 | 1 | 3 | 2 |

| NOTE: The range of average user ratings attributed to each cluster for each characteristic is as follows: | Reliability | Efficiency | Ease of Installation | Ease of Use | Trouble Shooting | Documentation | User Education | Vendor's Maintenance | Overall Satisfaction |
|---|---|---|---|---|---|---|---|---|---|
| Cluster 1: | 3.66 to 4.00 | 3.27 to 4.00 | 3.39 to 4.00 | 3.62 to 4.00 | 3.60 to 4.00 | 3.50 to 4.00 | 3.10 to 4.00 | 3.66 to 4.00 | 3.39 to 4.00 |
| Cluster 2: | 3.08 to 3.65 | 2.66 to 3.26 | 2.66 to 3.38 | 2.85 to 3.61 | 2.69 to 3.59 | 2.70 to 3.49 | 2.50 to 3.09 | 2.88 to 3.65 | 2.70 to 3.38 |
| Cluster 3: | 2.50 to 3.07 | 2.00 to 2.65 | 1.66 to 2.65 | 2.00 to 2.84 | 2.14 to 2.68 | 2.00 to 2.69 | 1.60 to 2.49 | 2.00 to 2.87 | 2.14 to 2.69 |
| Cluster 4: | Below 2.50 | Below 2.00 | Below 1.66 | Below 2.00 | Below 2.14 | Below 2.00 | Below 1.60 | Below 2.00 | Below 2.14 |

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# Users Rate Their Software

## Proprietary Software: User Ratings and Cluster Analysis

| Vendor and Package Name | No. of User Ratings Received | Mean Average User Ratings | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Vendor's Technical Support | | | | |
| | | Reliability | Efficiency | Ease of Installation | Ease of Use | Trouble Shooting | Documentation | User Education | Vendor's Maintenance | Overall Satisfaction |
| Infonational | | | | | | | | | | |
| General Ledger | 6 | 3.5 | 2.5 | 2.7 | 3.2 | 2.3 | 2.5 | 2.5 | 2.5 | 2.7 |
| Informatics Software | | | | | | | | | | |
| Accounts Payable | 3 | 3.0 | 1.3 | 2.3 | 2.7 | 1.3 | 2.7 | 1.3 | 1.7 | 2.3 |
| Accounting | 10 | 3.2 | 2.4 | 2.7 | 2.8 | 2.6 | 2.3 | 2.5 | 2.6 | 2.9 |
| Answer 2 | 3 | 3.3 | 2.7 | 3.0 | 3.3 | 2.7 | 3.7 | 2.7 | 2.7 | 3.0 |
| Mark IV | 53 | 3.6 | 2.8 | 3.2 | 3.1 | 3.0 | 3.0 | 3.0 | 2.9 | 3.1 |
| Trans IV | 7 | 3.4 | 3.1 | 3.4 | 3.0 | 3.0 | 2.9 | 2.8 | 3.0 | 3.1 |
| Information Associates Inc. | | | | | | | | | | |
| Financial Acctg. | 6 | 3.7 | 2.7 | 2.8 | 2.7 | 3.2 | 2.7 | 2.7 | 2.3 | 3.0 |
| Information Builders | | | | | | | | | | |
| Focus | 21 | 3.3 | 2.9 | 3.3 | 3.6 | 2.8 | 2.8 | 3.0 | 3.1 | 3.1 |
| Information Management Corp. | | | | | | | | | | |
| Vimos | 3 | 3.7 | 3.7 | 3.3 | 3.7 | 3.3 | 3.7 | 3.7 | 3.7 | 3.7 |
| Information Processing Inc. | | | | | | | | | | |
| Blis/Cobol | 3 | 3.7 | 3.0 | 3.3 | 3.3 | 3.0 | 3.3 | 3.3 | 3.0 | 3.0 |
| Information Science, Inc. | | | | | | | | | | |
| HRS | 5 | 3.6 | 2.6 | 3.0 | 3.0 | 3.4 | 2.8 | 2.6 | 2.4 | 3.0 |
| Payroll/Personnel | 7 | 3.3 | 2.9 | 2.7 | 2.9 | 3.1 | 2.6 | 2.6 | 3.0 | 3.0 |
| Innovation Data Processing | | | | | | | | | | |
| FDR/Compaktor | 55 | 3.9 | 3.8 | 3.7 | 3.7 | 3.5 | 3.4 | 2.9 | 3.4 | 3.7 |
| Insac Corp. | | | | | | | | | | |
| Space Manager | 7 | 3.6 | 3.4 | 2.7 | 3.4 | 3.0 | 2.9 | 2.5 | 2.9 | 3.1 |
| Insurance Systems of America | | | | | | | | | | |
| ABC | 4 | 2.8 | 2.3 | 2.3 | 2.0 | 2.5 | 2.0 | 2.5 | 2.5 | 2.5 |
| Integrated Software | | | | | | | | | | |
| Disspla | 7 | 3.4 | 2.9 | 3.0 | 3.1 | 3.3 | 2.9 | 2.8 | 2.8 | 3.3 |
| Tel-A-Graf | 10 | 3.8 | 3.2 | 3.3 | 3.6 | 3.0 | 3.6 | 2.9 | 3.4 | 3.6 |
| Intel | | | | | | | | | | |
| System 2000 | 12 | 3.6 | 2.6 | 2.9 | 3.5 | 2.9 | 2.6 | 3.0 | 3.3 | 3.0 |
| Intergraph Corp | | | | | | | | | | |
| IGDS3 | 3 | 2.3 | 2.7 | 2.3 | 3.0 | 1.3 | 2.3 | 3.0 | 2.7 | 2.7 |
| International Math and Stat | | | | | | | | | | |
| IMSL | 6 | 3.8 | 3.7 | 3.6 | 3.3 | 3.5 | 3.3 | 2.5 | 3.7 | 3.7 |
| International Systems, Inc | | | | | | | | | | |
| PAC II | 5 | 3.2 | 2.2 | 2.0 | 2.0 | 3.0 | 2.5 | 2.8 | 2.7 | 2.8 |
| Intertec | | | | | | | | | | |
| Map 3000 | 4 | 3.8 | 3.3 | 3.8 | 3.8 | 3.0 | 3.5 | 2.8 | 3.3 | 3.5 |

LEGEND Mean average user ratings for each package, as tabulated above, were calculated on a scale of 4 for each user rating of Excellent, 3 for Good, 2 for Fair, and 1 for Poor

Separate cluster analyses were then made of the mean average user ratings for all packages rated by three or more respondents. These cluster analyses were used to determine the ranges of mean average user ratings which can be interpreted as being in the highest cluster, the second, the third, and the fourth or lowest cluster for each characteristic. The mean averages which fall into each cluster group for each characteristic are listed at the bottom of the facing page. The resulting hierarchical cluster groupings for each package are tabulated on the facing page

REPRODUCED WITH PERMISSION

| Vendor and Package Name | No. of User Ratings Received | Hierarchical Cluster Groupings | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Vendor's Technical Support | | | | |
| | | Reliability | Efficiency | Ease of Installation | Ease of Use | Trouble Shooting | Documentation | User Education | Vendor's Maintenance | Overall Satisfaction |
| Infonational | | | | | | | | | | |
| General Ledger | 6 | 2 | 3 | 2 | 2 | 3 | 3 | 2 | 3 | 2 |
| Informatics Software | | | | | | | | | | |
| Accounts Payable | 3 | 3 | 4 | 3 | 3 | 4 | 2 | 4 | 4 | 3 |
| Accounting | 10 | 2 | 3 | 2 | 3 | 3 | 3 | 2 | 3 | 2 |
| Answer 2 | 3 | 2 | 2 | 2 | 2 | 2 | 1 | 2 | 3 | 2 |
| Mark IV | 53 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Trans IV | 7 | 2 | 2 | 1 | 2 | 2 | 2 | 2 | 2 | 2 |
| Information Associates Inc. | | | | | | | | | | |
| Financial Acctg. | 6 | 1 | 2 | 2 | 3 | 2 | 2 | 2 | 3 | 2 |
| Information Builders | | | | | | | | | | |
| Focus | 21 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Information Management Corp. | | | | | | | | | | |
| Vimos | 3 | 1 | 1 | 2 | 1 | 2 | 1 | 1 | 1 | 1 |
| Information Processing Inc. | | | | | | | | | | |
| Blis/Cobol | 3 | 1 | 2 | 2 | 2 | 2 | 2 | 1 | 2 | 2 |
| Information Science, Inc. | | | | | | | | | | |
| HRS | 5 | 2 | 3 | 2 | 2 | 2 | 2 | 2 | 3 | 2 |
| Payroll/Personnel | 7 | 2 | 2 | 2 | 2 | 2 | 3 | 2 | 2 | 2 |
| Innovation Data Processing | | | | | | | | | | |
| FDR/Compaktor | 5 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 1 |
| Insac Corp. | | | | | | | | | | |
| Shadow II | 9 | 2 | 1 | 2 | 2 | 3 | 2 | 2 | 2 | 2 |
| Space Manager | 7 | 2 | 1 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Insurance Systems of America | | | | | | | | | | |
| ABC | 4 | 3 | 3 | 3 | 3 | 3 | 3 | 2 | 3 | 3 |
| Integrated Software | | | | | | | | | | |
| Disspla | 7 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 3 | 2 |
| Tel-A-Graf | 10 | 1 | 2 | 2 | 2 | 2 | 1 | 2 | 2 | 1 |
| Intel | | | | | | | | | | |
| System 2000 | 12 | 2 | 3 | 2 | 2 | 2 | 3 | 2 | 2 | 2 |
| Intergraph Corp. | | | | | | | | | | |
| IGDS | 3 | 4 | 2 | 3 | 2 | 4 | 3 | 2 | 3 | 2 |
| International Math and Stat | | | | | | | | | | |
| IMSL | 6 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 1 | 1 |
| International Systems, Inc. | | | | | | | | | | |
| PAC II | 5 | 2 | 3 | 3 | 3 | 2 | 3 | 2 | 3 | 2 |
| Intertec | | | | | | | | | | |
| Map/3000 | 4 | 1 | 1 | 1 | 1 | 2 | 1 | 2 | 2 | 1 |
| NOTE The range of average user ratings attributed to each cluster for each characteristic is as follows | | | | | | | | | | |
| Cluster 1 | | 3.66 to 4.00 | 3.27 to 4.00 | 3.39 to 4.00 | 3.62 to 4.00 | 3.60 to 4.00 | 3.50 to 4.00 | 3.10 to 4.00 | 3.66 to 4.00 | 3.39 to 4.00 |
| Cluster 2 | | 3.08 to 3.65 | 2.66 to 3.26 | 2.66 to 3.38 | 2.85 to 3.61 | 2.69 to 3.59 | 2.70 to 3.49 | 2.50 to 3.09 | 2.88 to 3.65 | 2.70 to 3.38 |
| Cluster 3 | | 2.50 to 3.07 | 2.00 to 2.65 | 1.66 to 2.65 | 2.00 to 2.84 | 2.14 to 2.68 | 2.00 to 2.69 | 1.60 to 2.49 | 2.00 to 2.87 | 2.14 to 2.69 |
| Cluster 4 | | Below 2.50 | Below 2.00 | Below 1.66 | Below 2.00 | Below 2.14 | Below 2.00 | Below 1.60 | Below 2.00 | Below 2.14 |

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# Users Rate Their Software

## Proprietary Software: User Ratings and Cluster Analysis

| Vendor and Package Name | No. of User Ratings Received | Mean Average User Ratings | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Reliability | Efficiency | Ease of Installation | Ease of Use | Vendor's Technical Support | | | Vendor's Maintenance | Overall Satisfaction |
| | | | | | | Trouble Shooting | Documentation | User Education | | |
| Johnson Systems | | | | | | | | | | |
| JARS | 21 | 3.4 | 3.0 | 3.0 | 2.9 | 2.5 | 2.6 | 2.4 | 2.8 | 3.0 |
| Macro 4 | | | | | | | | | | |
| Dumpmaster | 5 | 3.8 | 3.6 | 3.6 | 3.4 | 3.3 | 2.8 | 2.5 | 3.3 | 3.2 |
| Management Control System | | | | | | | | | | |
| Financial Reporting | 3 | 3.3 | 3.0 | 3.0 | 2.7 | 3.7 | 3.3 | 3.3 | 3.7 | 3.3 |
| Practice Management | 8 | 3.3 | 2.9 | 2.4 | 2.6 | 2.8 | 1.9 | 2.4 | 2.4 | 2.3 |
| Management Decision System | | | | | | | | | | |
| Express | 3 | 3.3 | 2.3 | 4.0 | 3.0 | 3.3 | 2.7 | 2.3 | 3.3 | 3.3 |
| Management Science America | | | | | | | | | | |
| Accounts Payable | 9 | 3.6 | 2.9 | 3.0 | 3.1 | 3.2 | 2.8 | 3.2 | 2.7 | 3.2 |
| Accounts Receivable | 4 | 2.8 | 2.3 | 2.5 | 2.8 | 3.0 | 2.3 | 3.0 | 2.3 | 2.3 |
| Alltax | 7 | 3.4 | 3.1 | 2.9 | 3.1 | 3.3 | 3.0 | 3.0 | 3.3 | 3.4 |
| Fixed Assets | 13 | 2.9 | 2.6 | 2.6 | 2.7 | 2.4 | 3.0 | 2.9 | 2.6 | 2.6 |
| FICS | 7 | 2.3 | 2.2 | 2.0 | 2.2 | 2.2 | 2.3 | 2.2 | 2.3 | 2.2 |
| General Ledger | 35 | 3.1 | 2.2 | 2.3 | 2.5 | 2.3 | 2.6 | 2.7 | 2.6 | 2.6 |
| Payroll | 63 | 3.3 | 2.4 | 2.3 | 2.5 | 2.5 | 2.8 | 2.8 | 2.8 | 2.8 |
| Personnel | 4 | 3.3 | 2.0 | 2.5 | 2.5 | 2.5 | 3.0 | 3.3 | 3.3 | 2.8 |
| Supply Inventory | 8 | 3.5 | 2.9 | 2.9 | 3.0 | 2.3 | 3.0 | 2.8 | 2.7 | 2.9 |
| Martin Marietta | | | | | | | | | | |
| MAS II | 3 | 1.5 | 2.0 | 1.5 | 2.0 | 1.5 | 2.5 | 2.0 | 1.5 | 2.0 |
| Mathematica Products Group | | | | | | | | | | |
| RAMIS II | 22 | 3.5 | 2.9 | 3.4 | 3.6 | 3.0 | 3.1 | 3.3 | 3.2 | 3.4 |
| Mathis & Assoc | | | | | | | | | | |
| UPG | 5 | 3.6 | 3.6 | 3.8 | 3.4 | 3.2 | 3.4 | 2.8 | 3.6 | 3.6 |
| McCormack & Dodge | | | | | | | | | | |
| Accounts Payable | 11 | 2.7 | 2.4 | 1.9 | 2.7 | 2.6 | 2.7 | 2.3 | 2.0 | 2.3 |
| Fixed Assets | 11 | 3.1 | 2.7 | 2.9 | 3.1 | 2.5 | 3.1 | 3.0 | 2.8 | 3.0 |
| General Ledger Plus | 32 | 3.6 | 2.8 | 3.0 | 3.1 | 3.0 | 3.1 | 3.3 | 3.0 | 3.2 |
| McDonnel Douglas | | | | | | | | | | |
| MHS | 5 | 2.6 | 2.4 | 2.2 | 2.2 | 2.2 | 2.4 | 1.8 | 2.4 | 2.4 |
| Medical Information Tech. | | | | | | | | | | |
| MIIS | 3 | 4.0 | 3.7 | 4.0 | 4.0 | 4.0 | 2.7 | 3.3 | 4.0 | 4.0 |
| Micropro | | | | | | | | | | |
| Datastar | 4 | 3.0 | 2.3 | 3.0 | 2.5 | 2.5 | 2.8 | 2.5 | 2.3 | 2.8 |
| Supersort | 3 | 3.0 | 3.0 | 2.7 | 2.3 | 2.7 | 3.3 | 2.3 | 2.7 | 3.0 |
| Wordstar | 25 | 3.7 | 3.5 | 3.4 | 3.3 | 2.9 | 3.0 | 2.8 | 3.2 | 3.5 |
| Microsoft | | | | | | | | | | |
| Basic | 9 | 3.7 | 2.8 | 3.4 | 3.3 | 2.8 | 3.0 | 2.7 | 2.6 | 3.1 |
| Fortran 80 | 3 | 3.3 | 3.0 | 3.7 | 3.0 | 2.3 | 2.3 | 2.0 | 2.3 | 3.3 |
| Mid-American Control Corp | | | | | | | | | | |
| PROMPT | 4 | 3.0 | 2.3 | 3.5 | 3.5 | 2.8 | 2.0 | 2.8 | 3.0 | 2.5 |

LEGEND: Mean average user ratings for each package, as tabulated above, were calculated on a scale of 4 for each user rating of Excellent, 3 for Good, 2 for Fair, and 1 for Poor.

Separate cluster analyses were then made of the mean average user ratings for all packages rated by three or more respondents These cluster analyses were used to determine the ranges of mean average user ratings which can be interpreted as being in the highest cluster, the second, the third, and the fourth or lowest cluster for each characteristic The mean averages which fall into each cluster group for each characteristic are listed at the bottom of the facing page The resulting hierarchical cluster groupings for each package are tabulated on the facing page

**REPRODUCED WITH PERMISSION**

| Vendor and Package Name | No. of User Ratings Received | Hierarchical Cluster Groupings | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Reliability | Efficiency | Ease of Installation | Ease of Use | Vendor's Technical Support | | | Vendor's Maintenance | Overall Satisfaction |
| | | | | | | Trouble Shooting | Documentation | User Education | | |
| Johnson Systems | | | | | | | | | | |
| JARS | 21 | 2 | 2 | 2 | 2 | 3 | 3 | 3 | 3 | 2 |
| Macro 4 | | | | | | | | | | |
| Dumpmaster | 5 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 2 |
| Management Control System | | | | | | | | | | |
| Financial Reporting | 3 | 2 | 2 | 2 | 3 | 1 | 2 | 1 | 1 | 2 |
| Practice Management | 8 | 2 | 2 | 3 | 3 | 2 | 4 | 3 | 3 | 3 |
| Management Decision System | | | | | | | | | | |
| Express | 3 | 2 | 3 | 1 | 2 | 2 | 2 | 3 | 2 | 2 |
| Management Science America | | | | | | | | | | |
| Accounts Payable | 9 | 2 | 2 | 2 | 2 | 2 | 2 | 1 | 3 | 2 |
| Accounts Receivable | 4 | 3 | 3 | 3 | 3 | 2 | 3 | 2 | 3 | 3 |
| Alltax | 7 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 1 |
| Fixed Assets | 13 | 3 | 3 | 3 | 3 | 3 | 2 | 2 | 3 | 3 |
| FICS | 7 | 4 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| General Ledger | 35 | 2 | 3 | 3 | 3 | 3 | 3 | 2 | 3 | 3 |
| Payroll | 63 | 2 | 3 | 3 | 3 | 3 | 2 | 2 | 3 | 2 |
| Personnel | 4 | 2 | 3 | 3 | 3 | 3 | 2 | 1 | 2 | 2 |
| Supply Inventory | 8 | 2 | 2 | 2 | 2 | 3 | 2 | 2 | 3 | 2 |
| Martin Marietta | | | | | | | | | | |
| MAS II | 3 | 4 | 3 | 4 | 3 | 4 | 3 | 3 | 4 | 4 |
| Mathematica Products Group | | | | | | | | | | |
| RAMIS II | 22 | 2 | 2 | 1 | 2 | 2 | 2 | 1 | 2 | 1 |
| Mathis & Assoc | | | | | | | | | | |
| UPG | 5 | 2 | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 1 |
| McCormack & Dodge | | | | | | | | | | |
| Accounts Payable | 11 | 3 | 3 | 3 | 3 | 3 | 2 | 3 | 3 | 3 |
| Fixed Assets | 11 | 2 | 2 | 2 | 2 | 3 | 2 | 2 | 3 | 2 |
| General Ledger Plus | 32 | 2 | 2 | 2 | 2 | 2 | 2 | 1 | 2 | 2 |
| McDonnel Douglas | | | | | | | | | | |
| MHS | 5 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| Medical Information Tech. | | | | | | | | | | |
| MIIS | 3 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 1 |
| Micropro | | | | | | | | | | |
| Datastar | 4 | 3 | 3 | 2 | 3 | 3 | 2 | 2 | 3 | 2 |
| Supersort | 3 | 3 | 2 | 2 | 3 | 2 | 2 | 3 | 3 | 2 |
| Wordstar | 25 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 1 |
| Microsoft | | | | | | | | | | |
| Basic | 9 | 1 | 2 | 1 | 2 | 2 | 2 | 2 | 3 | 2 |
| Fortran 80 | 3 | 2 | 2 | 1 | 2 | 3 | 3 | 3 | 3 | 2 |
| Mid-American Control Corp | | | | | | | | | | |
| PROMPT | 4 | 3 | 3 | 1 | 2 | 2 | 3 | 2 | 2 | 3 |
| NOTE The range of average user ratings attributed to each cluster for each characteristic is as follows | | | | | | | | | | |
| Cluster 1: | | 3.66 to 4.00 | 3.27 to 4.00 | 3.39 to 4.00 | 3.62 to 4.00 | 3.60 to 4.00 | 3.50 to 4.00 | 3.10 to 4.00 | 3.66 to 4.00 | 3.39 to 4.00 |
| Cluster 2: | | 3.08 to 3.65 | 2.66 to 3.26 | 2.66 to 3.38 | 2.85 to 3.61 | 2.69 to 3.59 | 2.70 to 3.49 | 2.50 to 3.09 | 2.88 to 3.65 | 2.70 to 3.38 |
| Cluster 3: | | 2.50 to 3.07 | 2.00 to 2.65 | 1.66 to 2.65 | 2.00 to 2.84 | 2.14 to 2.68 | 2.00 to 2.69 | 1.60 to 2.49 | 2.00 to 2.87 | 2.14 to 2.69 |
| Cluster 4: | | Below 2.50 | Below 2.00 | Below 1.66 | Below 2.00 | Below 2.14 | Below 2.00 | Below 1.60 | Below 2.00 | Below 2.14 |

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# Users Rate Their Software

## Proprietary Software: User Ratings and Cluster Analysis

| Vendor and Package Name | No. of User Ratings Received | Mean Average User Ratings | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Vendor's Technical Support | | | | |
| | | Reliability | Efficiency | Ease of Installation | Ease of Use | Trouble Shooting | Documentation | User Education | Vendor's Maintenance | Overall Satisfaction |
| Minicomputer Business Appl. | | | | | | | | | | |
| Accounts Receivable | 9 | 3.0 | 2.1 | 3.4 | 3.3 | 1.8 | 3.3 | 2.1 | 2.4 | 2.8 |
| Accounting | 7 | 3.0 | 2.6 | 2.6 | 2.8 | 1.6 | 2.4 | 1.5 | 2.2 | 2.3 |
| General Ledger | 8 | 3.3 | 3.1 | 3.3 | 3.3 | 2.8 | 3.3 | 2.8 | 3.3 | 3.1 |
| Manufacturing | 6 | 3.5 | 3.2 | 3.0 | 3.3 | 3.0 | 3.0 | 2.6 | 3.0 | 3.3 |
| Payroll | 3 | 3.3 | 3.0 | 3.0 | 3.0 | 3.0 | 2.7 | 2.7 | 2.7 | 3.0 |
| Morino Associates | | | | | | | | | | |
| MICS | 4 | 3.0 | 2.5 | 3.3 | 3.5 | 3.5 | 3.0 | 3.3 | 3.3 | 3.3 |
| TSO/MON | 5 | 3.6 | 3.8 | 3.2 | 3.4 | 3.8 | 3.2 | 3.0 | 3.8 | 3.6 |
| Mountain Software Growers | | | | | | | | | | |
| Equal 62 | 3 | 3.7 | 3.0 | 2.7 | 3.0 | 2.0 | 2.0 | 2.3 | 2.0 | 2.7 |
| MSP | | | | | | | | | | |
| Data Manager | 6 | 3.5 | 3.2 | 3.2 | 3.2 | 3.2 | 2.7 | 2.5 | 3.0 | 3.2 |
| National Computing Inc. | | | | | | | | | | |
| Owl | 9 | 3.2 | 3.4 | 3.1 | 3.4 | 2.9 | 2.9 | 2.6 | 2.9 | 3.1 |
| Slick | 5 | 3.6 | 3.5 | 3.0 | 3.0 | 2.8 | 3.2 | 2.2 | 2.8 | 3.2 |
| NCR Corporation | | | | | | | | | | |
| CIF | 11 | 3.4 | 2.9 | 2.4 | 2.8 | 2.2 | 2.5 | 2.1 | 2.5 | 2.9 |
| Class | 5 | 2.8 | 2.6 | 2.0 | 2.4 | 1.8 | 2.2 | 2.2 | 2.2 | 2.4 |
| Data Collection | 3 | 3.3 | 3.0 | 3.0 | 2.7 | 2.3 | 2.3 | 3.0 | 2.7 | 2.7 |
| IFMS | 4 | 2.3 | 2.0 | 1.8 | 2.0 | 2.8 | 1.8 | 1.8 | 1.8 | 2.0 |
| IGAS | 5 | 3.0 | 2.8 | 3.8 | 3.4 | 2.6 | 2.6 | 2.4 | 2.8 | 2.8 |
| IHIS | 3 | 2.7 | 2.0 | 2.3 | 2.7 | 2.7 | 2.7 | 2.7 | 2.7 | 2.3 |
| Item | 3 | 3.0 | 2.3 | 1.3 | 3.0 | 2.7 | 2.3 | 2.3 | 2.7 | 2.3 |
| IWDS | 3 | 3.3 | 2.3 | 1.7 | 3.3 | 1.7 | 2.0 | 2.0 | 1.0 | 2.3 |
| Payroll | 12 | 2.8 | 2.5 | 2.7 | 2.8 | 2.5 | 2.5 | 2.0 | 2.0 | 2.4 |
| Scholar Package | 4 | 3.5 | 2.5 | 3.5 | 2.5 | 2.0 | 3.3 | 2.3 | 2.0 | 3.0 |
| Spirit | 3 | 3.0 | 3.0 | 2.5 | 2.7 | 2.3 | 2.0 | 1.7 | 1.7 | 2.3 |
| Status | 4 | 3.5 | 3.3 | 2.8 | 3.0 | 2.5 | 2.5 | 2.0 | 3.3 | 2.8 |
| Nichols & Co. | | | | | | | | | | |
| N-5500 | 3 | 3.3 | 2.3 | 3.0 | 3.0 | 3.0 | 2.7 | 3.0 | 3.0 | 3.0 |
| Nixdorf Computer Software | | | | | | | | | | |
| EDOS | 8 | 3.6 | 3.6 | 3.4 | 3.8 | 3.0 | 3.4 | 3.0 | 3.3 | 3.5 |
| EDOS/VS | 4 | 3.3 | 3.3 | 3.8 | 3.5 | 2.8 | 2.5 | 2.8 | 3.0 | 3.3 |
| Office Manager | | | | | | | | | | |
| Distributor Manager | 3 | 4.0 | 3.3 | 3.3 | 3.7 | 3.7 | 3.7 | 3.5 | 3.7 | 3.3 |
| General Bus System | 3 | 4.0 | 4.0 | 4.0 | 4.0 | 3.7 | 4.0 | 3.7 | 4.0 | 4.0 |
| On-Line Business Systems | | | | | | | | | | |
| Wylbur | 3 | 4.0 | 3.7 | 3.7 | 3.3 | 3.0 | 2.0 | 2.0 | 3.0 | 3.0 |
| On-Line Software Int. | | | | | | | | | | |
| Intertest | 4 | 3.3 | 3.0 | 2.5 | 3.3 | 2.3 | 3.5 | 2.8 | 3.3 | 3.0 |
| Oregon Minicomputer Software | | | | | | | | | | |
| Pascal-1 | 4 | 3.5 | 3.3 | 3.3 | 2.5 | 3.3 | 3.5 | 2.5 | 3.0 | 3.0 |

LEGEND. Mean average user ratings for each package, as tabulated above, were calculated on a scale of 4 for each user rating of Excellent, 3 for Good, 2 for Fair, and 1 for Poor

Separate cluster analyses were then made of the mean average user ratings for all packages rated by three or more respondents. These cluster analyses were used to determine the ranges of mean average user ratings which can be interpreted as being in the highest cluster, the second, the third, and the fourth or lowest cluster for each characteristic. The mean averages which fall into each cluster group for each characteristic are listed at the bottom of the facing page. The resulting hierarchical cluster groupings for each package are tabulated on the facing page

REPRODUCED WITH PERMISSION

| Vendor and Package Name | No. of User Ratings Received | Hierarchical Cluster Groupings | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Vendor's Technical Support | | | | |
| | | Reliability | Efficiency | Ease of Installation | Ease of Use | Trouble Shooting | Documentation | User Education | Vendor's Maintenance | Overall Satisfaction |
| Minicomputer Business Appl. | | | | | | | | | | |
| Accounts Receivable | 9 | 3 | 3 | 1 | 2 | 4 | 2 | 3 | 3 | 2 |
| Accounting | 7 | 3 | 3 | 3 | 3 | 4 | 3 | 4 | 3 | 3 |
| General Ledger | 8 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Manufacturing | 6 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Payroll | 3 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 3 | 3 |
| Morino Associates | | | | | | | | | | |
| MICS | 4 | 3 | 3 | 2 | 2 | 2 | 2 | 1 | 2 | 2 |
| TSO/MON | 5 | 2 | 1 | 2 | 2 | 1 | 2 | 2 | 1 | 1 |
| Mountain Software Growers | | | | | | | | | | |
| Equal/62 | 3 | 1 | 2 | 2 | 2 | 4 | 3 | 3 | 3 | 2 |
| MSP | | | | | | | | | | |
| Data Manager | 6 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| National Computing Inc. | | | | | | | | | | |
| O-W-L | 9 | 2 | 1 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Slick | 5 | 2 | 1 | 2 | 2 | 2 | 2 | 3 | 3 | 2 |
| NCR Corporation | | | | | | | | | | |
| CIF | 11 | 2 | 2 | 3 | 3 | 3 | 3 | 3 | 3 | 2 |
| Class | 5 | 3 | 3 | 3 | 3 | 4 | 3 | 3 | 3 | 3 |
| Data Collection | 3 | 2 | 2 | 2 | 3 | 3 | 3 | 2 | 3 | 2 |
| IFMS | 4 | 4 | 3 | 3 | 3 | 2 | 4 | 3 | 4 | 4 |
| IGAS | 5 | 3 | 2 | 1 | 2 | 3 | 3 | 3 | 3 | 2 |
| IHIS | 3 | 3 | 3 | 3 | 3 | 2 | 2 | 2 | 3 | 3 |
| Item | 3 | 3 | 3 | 4 | 2 | 2 | 3 | 3 | 3 | 3 |
| IWDS | 3 | 2 | 3 | 3 | 2 | 4 | 3 | 3 | 4 | 3 |
| Payroll | 12 | 3 | 3 | 2 | 3 | 3 | 3 | 3 | 3 | 3 |
| Scholar Package | 4 | 2 | 3 | 1 | 3 | 4 | 2 | 3 | 3 | 2 |
| Spirit | 3 | 3 | 2 | 3 | 3 | 3 | 3 | 3 | 4 | 3 |
| Status | 4 | 2 | 1 | 2 | 2 | 3 | 3 | 3 | 2 | 2 |
| Nichols & Co. | | | | | | | | | | |
| N-5500 | 3 | 2 | 3 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Nixdorf Computer Software | | | | | | | | | | |
| EDOS | 8 | 2 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 1 |
| EDOS/VS | 4 | 2 | 1 | 1 | 2 | 2 | 3 | 2 | 2 | 2 |
| Office Manager | | | | | | | | | | |
| Distributor Manager | 3 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 2 |
| General Bus System | 3 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| On-Line Business Systems | | | | | | | | | | |
| Wylbur | 3 | 1 | 1 | 1 | 2 | 2 | 3 | 3 | 2 | 2 |
| On-Line Software Int. | | | | | | | | | | |
| Intertest | 4 | 2 | 2 | 3 | 2 | 3 | 1 | 2 | 2 | 2 |
| Oregon Minicomputer Software | | | | | | | | | | |
| Pascal-1 | 4 | 2 | 1 | 2 | 3 | 2 | 1 | 2 | 2 | 2 |
| NOTE The range of average user ratings attributed to each cluster for each characteristic is as follows | | | | | | | | | | |
| Cluster 1 | | 3.66 to 4.00 | 3.27 to 4.00 | 3.39 to 4.00 | 3.62 to 4.00 | 3.60 to 4.00 | 3.50 to 4.00 | 3.10 to 4.00 | 3.66 to 4.00 | 3.39 to 4.00 |
| Cluster 2 | | 3.08 to 3.65 | 2.66 to 3.26 | 2.66 to 3.38 | 2.85 to 3.61 | 2.69 to 3.59 | 2.70 to 3.49 | 2.50 to 3.09 | 2.88 to 3.65 | 2.70 to 3.38 |
| Cluster 3 | | 2.50 to 3.07 | 2.00 to 2.65 | 1.66 to 2.65 | 2.00 to 2.84 | 2.14 to 2.68 | 2.00 to 2.69 | 1.60 to 2.49 | 2.00 to 2.87 | 2.14 to 2.69 |
| Cluster 4 | | Below 2.50 | Below 2.00 | Below 1.66 | Below 2.00 | Below 2.14 | Below 2.00 | Below 1.60 | Below 2.00 | Below 2.14 |

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# Users Rate Their Software

## Proprietary Software: User Ratings and Cluster Analysis

| Vendor and Package Name | No. of User Ratings Received | Mean Average User Ratings | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Reliability | Efficiency | Ease of Installation | Ease of Use | Vendor's Technical Support: Trouble Shooting | Vendor's Technical Support: Documentation | Vendor's Technical Support: User Education | Vendor's Maintenance | Overall Satisfaction |
| Oxford Software Corp | | | | | | | | | | |
| UFO | 16 | 3.3 | 2.9 | 3.7 | 3.6 | 2.9 | 2.8 | 2.8 | 3.0 | 3.3 |
| Pansophic Systems | | | | | | | | | | |
| Easytrieve | 81 | 3.7 | 3.2 | 3.5 | 3.3 | 3.1 | 3.1 | 2.9 | 3.3 | 3.4 |
| Pan Audit | 4 | 3.7 | 3.3 | 3.3 | 3.3 | 3.0 | 3.3 | 3.0 | 3.0 | 3.3 |
| Panvalet | 107 | 3.8 | 3.5 | 3.5 | 3.5 | 3.1 | 3.2 | 2.8 | 3.3 | 3.4 |
| Para Research | | | | | | | | | | |
| General Ledger | 3 | 4.0 | 3.3 | 4.0 | 3.0 | 2.7 | 3.3 | 3.0 | 3.0 | 3.7 |
| Paratext | 13 | 3.4 | 3.1 | 3.3 | 2.8 | 2.8 | 2.8 | 2.5 | 2.9 | 3.1 |
| Peachtree | | | | | | | | | | |
| Accounting | 3 | 4.0 | 3.7 | 4.0 | 4.0 | 4.0 | 3.7 | 3.7 | 3.5 | 3.7 |
| Magic Wand | 9 | 3.8 | 3.6 | 3.6 | 3.7 | 2.8 | 3.3 | 3.3 | 2.9 | 3.8 |
| Perkin-Elmer | | | | | | | | | | |
| OS-32 | 4 | 3.0 | 3.3 | 3.8 | 3.5 | 1.3 | 1.8 | 1.3 | 1.3 | 3.0 |
| Personal Software | | | | | | | | | | |
| Visicalc | 31 | 3.8 | 3.6 | 3.8 | 3.5 | 3.2 | 3.6 | 3.3 | 3.4 | 3.6 |
| Personnel Data Systems | | | | | | | | | | |
| PASS | 4 | 2.5 | 2.3 | 1.8 | 2.8 | 2.5 | 1.5 | 2.3 | 2.3 | 2.3 |
| Phoenix Computer Co | | | | | | | | | | |
| Condor | 7 | 3.7 | 3.4 | 3.3 | 3.1 | 3.8 | 2.6 | 2.3 | 3.6 | 3.1 |
| Poise Company | | | | | | | | | | |
| Poise | 10 | 3.4 | 2.5 | 3.3 | 3.5 | 2.7 | 2.7 | 3.0 | 3.0 | 2.8 |
| Prime Computer | | | | | | | | | | |
| Cobol | 4 | 2.5 | 2.0 | 2.5 | 3.0 | 2.0 | 2.3 | 2.3 | 1.5 | 2.0 |
| Fortran | 3 | 3.7 | 2.7 | 3.0 | 2.3 | 3.3 | 2.0 | 3.5 | 2.7 | 2.7 |
| Primenet | 5 | 2.8 | 3.0 | 3.8 | 3.8 | 2.3 | 3.0 | 2.6 | 3.3 | 3.0 |
| Primos | 3 | 4.0 | 3.3 | 3.7 | 3.3 | 3.0 | 3.0 | 3.0 | 3.3 | 3.7 |
| Qantel | | | | | | | | | | |
| Solution | 4 | 4.0 | 3.3 | 3.5 | 3.3 | 3.5 | 3.8 | 3.8 | 3.5 | 3.5 |
| Quality Systems | | | | | | | | | | |
| Vcon | 3 | 4.0 | 4.0 | 4.0 | 3.7 | 3.7 | 2.3 | 2.7 | 3.3 | 4.0 |
| Quasar | | | | | | | | | | |
| Quiz | 11 | 3.9 | 3.2 | 3.8 | 3.6 | 3.2 | 2.9 | 2.6 | 3.2 | 3.5 |
| Radio Shack | | | | | | | | | | |
| Scripsit | 6 | 3.0 | 3.3 | 3.7 | 2.8 | 2.3 | 2.3 | 2.2 | 2.2 | 3.0 |
| TRS DOS | 4 | 2.5 | 2.0 | 2.5 | 2.5 | 1.8 | 2.8 | 3.0 | 1.5 | 2.0 |
| Rego Software Ltd | | | | | | | | | | |
| Adager | 6 | 3.7 | 3.5 | 3.7 | 3.3 | 3.3 | 3.0 | 2.3 | 3.5 | 3.5 |
| Retida Inc | | | | | | | | | | |
| Datacomp | 3 | 3.3 | 3.0 | 3.5 | 3.0 | 3.0 | 3.5 | 3.0 | 2.5 | 3.0 |

LEGEND: Mean average user ratings for each package, as tabulated above, were calculated on a scale of 4 for each user rating of Excellent, 3 for Good, 2 for Fair, and 1 for Poor.

Separate cluster analyses were then made of the mean average user ratings for all packages rated by three or more respondents. These cluster analyses were used to determine the ranges of mean average user ratings which can be interpreted as being in the highest cluster, the second, the third, and the fourth or lowest cluster for each characteristic. The mean averages which fall into each cluster group for each characteristic are listed at the bottom of the facing page. The resulting hierarchical cluster groupings for each package are tabulated on the facing page.

**REPRODUCED WITH PERMISSION**

| Vendor and Package Name | No. of User Ratings Received | Hierarchical Cluster Groupings | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Reliability | Efficiency | Ease of Installation | Ease of Use | Vendor's Technical Support: Trouble Shooting | Vendor's Technical Support: Documentation | Vendor's Technical Support: User Education | Vendor's Maintenance | Overall Satisfaction |
| Oxford Software Corp. | | | | | | | | | | |
| UFO | 16 | 2 | 2 | 1 | 2 | 2 | 2 | 2 | 2 | 2 |
| Pansophic Systems | | | | | | | | | | |
| Easytrieve | 81 | 1 | 2 | 1 | 2 | 2 | 2 | 2 | 2 | 1 |
| Panaudit | 4 | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Panvalet | 107 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 1 |
| Para Research | | | | | | | | | | |
| General Ledger | 3 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 1 |
| Paratext | 13 | 2 | 2 | 2 | 3 | 2 | 2 | 2 | 2 | 2 |
| Peachtree | | | | | | | | | | |
| Accounting | 3 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 1 |
| Magic Wand | 9 | 1 | 1 | 1 | 1 | 2 | 2 | 1 | 2 | 1 |
| Perkin-Elmer | | | | | | | | | | |
| OS-32 | 4 | 3 | 1 | 1 | 2 | 4 | 4 | 4 | 4 | 2 |
| Personal Software | | | | | | | | | | |
| Visicalc | 31 | 1 | 1 | 1 | 2 | 2 | 1 | 1 | 2 | 1 |
| Personnel Data Systems | | | | | | | | | | |
| PASS | 4 | 3 | 3 | 3 | 3 | 3 | 4 | 3 | 3 | 3 |
| Phoenix Computer Co. | | | | | | | | | | |
| Condor | 7 | 1 | 1 | 2 | 2 | 1 | 3 | 3 | 2 | 2 |
| Poise Company | | | | | | | | | | |
| Poise | 10 | 2 | 3 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Prime Computer | | | | | | | | | | |
| Cobol | 4 | 3 | 3 | 3 | 2 | 4 | 3 | 3 | 4 | 4 |
| Fortran | 3 | 1 | 2 | 2 | 3 | 2 | 3 | 1 | 3 | 2 |
| Primenet | 5 | 3 | 2 | 1 | 1 | 3 | 2 | 2 | 2 | 2 |
| Primos | 3 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 1 |
| Qantel | | | | | | | | | | |
| Solution | 4 | 1 | 1 | 1 | 2 | 2 | 1 | 1 | 2 | 1 |
| Quality Systems | | | | | | | | | | |
| Vcon | 3 | 1 | 1 | 1 | 1 | 1 | 3 | 2 | 2 | 1 |
| Quasar | | | | | | | | | | |
| Quiz | 11 | 1 | 2 | 1 | 2 | 2 | 2 | 2 | 2 | 1 |
| Radio Shack | | | | | | | | | | |
| Scripsit | 6 | 3 | 1 | 1 | 3 | 3 | 3 | 3 | 3 | 2 |
| TRS DOS | 4 | 3 | 3 | 3 | 3 | 4 | 2 | 2 | 4 | 4 |
| Rego Software Ltd. | | | | | | | | | | |
| Adager | 6 | 1 | 1 | 1 | 2 | 2 | 2 | 3 | 2 | 1 |
| Retida Inc. | | | | | | | | | | |
| Datacomp. | 3 | 2 | 2 | 1 | 2 | 2 | 1 | 2 | 3 | 2 |
| NOTE: The range of average user ratings attributed to each cluster for each characteristic is as follows: | | | | | | | | | | |
| Cluster 1: | | 3.66 to 4.00 | 3.27 to 4.00 | 3.39 to 4.00 | 3.62 to 4.00 | 3.60 to 4.00 | 3.50 to 4.00 | 3.10 to 4.00 | 3.66 to 4.00 | 3.39 to 4.00 |
| Cluster 2: | | 3.08 to 3.65 | 2.66 to 3.26 | 2.66 to 3.38 | 2.85 to 3.61 | 2.69 to 3.59 | 2.70 to 3.49 | 2.50 to 3.09 | 2.88 to 3.65 | 2.70 to 3.38 |
| Cluster 3: | | 2.50 to 3.07 | 2.00 to 2.65 | 1.66 to 2.65 | 2.00 to 2.84 | 2.14 to 2.68 | 2.00 to 2.69 | 1.60 to 2.49 | 2.00 to 2.87 | 2.14 to 2.69 |
| Cluster 4: | | Below 2.50 | Below 2.00 | Below 1.66 | Below 2.00 | Below 2.14 | Below 2.00 | Below 1.60 | Below 2.00 | Below 2.14 |

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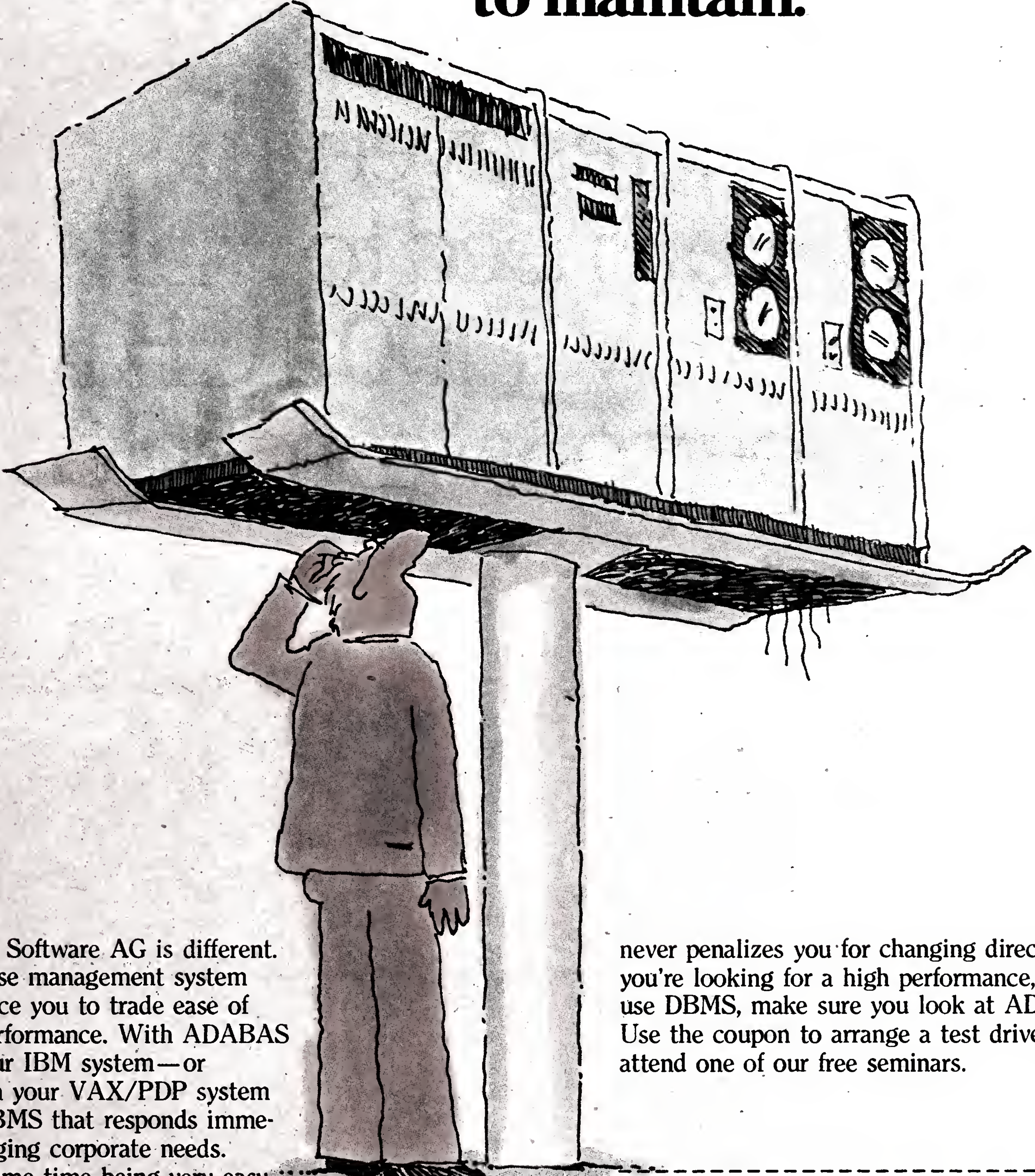
# Some data base management systems are like sports cars.

## Hard to start and expensive to maintain.



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CW 1221

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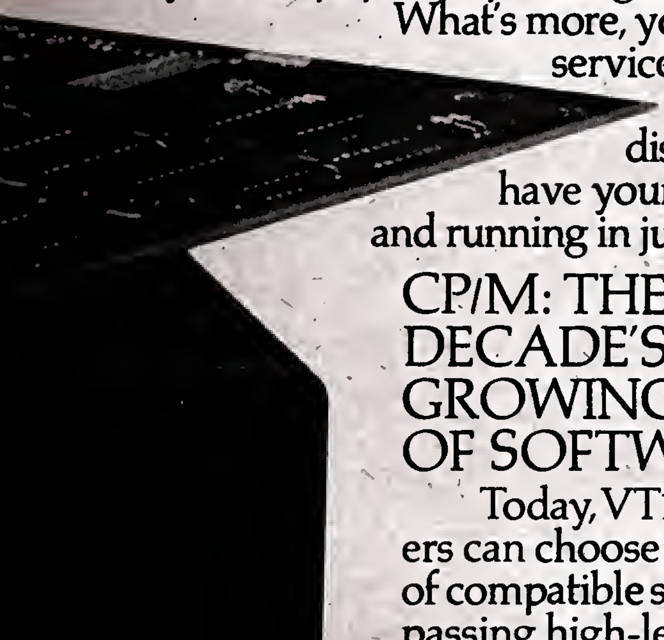

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# Users Rate Their Software

## Proprietary Software: User Ratings and Cluster Analysis

| Vendor and Package Name | No. of User Ratings Received | Mean Average User Ratings | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Reliability | Efficiency | Ease of Installation | Ease of Use | Vendor's Technical Support | | | Vendor's Maintenance | Overall Satisfaction |
| | | | | | | Trouble Shooting | Documentation | User Education | | |
| S A B Inc | | | | | | | | | | |
| Software 1040 | 9 | 3.4 | 3.0 | 3.3 | 3.3 | 3.3 | 2.9 | 3.0 | 3.3 | 3.3 |
| Saddlebrook | | | | | | | | | | |
| Financial | 4 | 3.5 | 3.3 | 3.3 | 3.5 | 3.0 | 2.8 | 3.5 | 3.0 | 3.3 |
| General Ledger | 3 | 3.7 | 3.7 | 3.7 | 3.7 | 3.7 | 3.7 | 2.7 | 3.7 | 3.7 |
| SAS Institute | | | | | | | | | | |
| SAS | 68 | 3.7 | 3.3 | 3.5 | 3.5 | 3.3 | 3.3 | 3.2 | 3.4 | 3.6 |
| Saturn Systems | | | | | | | | | | |
| Saturn WP | 4 | 3.8 | 3.3 | 2.8 | 3.0 | 2.3 | 3.0 | 3.0 | 2.8 | 3.3 |
| Scientific Management | | | | | | | | | | |
| IDOL | 3 | 3.7 | 3.0 | 3.0 | 3.3 | 3.3 | 2.3 | 2.3 | 3.0 | 2.7 |
| SDA Products | | | | | | | | | | |
| Intercomm | 4 | 2.8 | 2.5 | 1.8 | 2.3 | 2.3 | 2.0 | 2.3 | 2.0 | 2.3 |
| Score | 3 | 3.3 | 3.0 | 3.7 | 3.3 | 3.3 | 3.0 | 2.7 | 3.3 | 3.3 |
| SDI | | | | | | | | | | |
| Epat | 17 | 3.7 | 3.5 | 2.9 | 3.6 | 2.4 | 2.8 | 2.6 | 2.8 | 3.2 |
| Grasp | 4 | 3.0 | 3.5 | 3.3 | 3.5 | 2.8 | 2.8 | 2.5 | 2.5 | 3.0 |
| Reach | 3 | 3.0 | 3.0 | 3.3 | 3.7 | 2.3 | 3.0 | 3.0 | 2.3 | 3.0 |
| S & H Computer Leasing | | | | | | | | | | |
| TSX | 8 | 3.4 | 3.6 | 3.5 | 3.8 | 2.6 | 2.9 | 2.0 | 2.5 | 3.1 |
| Shaw Associates | | | | | | | | | | |
| CL70 | 5 | 3.0 | 2.6 | 2.2 | 2.6 | 2.8 | 3.2 | 2.6 | 2.6 | 2.8 |
| Signal Technology | | | | | | | | | | |
| PACS | 3 | 2.3 | 2.3 | 2.7 | 2.7 | 1.7 | 2.3 | 2.0 | 2.0 | 2.3 |
| Software AG of N.A | | | | | | | | | | |
| Adabase | 41 | 3.6 | 3.2 | 3.2 | 3.4 | 2.8 | 2.8 | 2.8 | 2.9 | 3.2 |
| Complete | 5 | 3.6 | 3.2 | 3.2 | 3.4 | 2.2 | 2.8 | 2.0 | 3.0 | 3.2 |
| Natural | 7 | 3.6 | 3.0 | 3.4 | 3.7 | 2.7 | 2.4 | 2.6 | 2.7 | 3.4 |
| Software House | | | | | | | | | | |
| System 1022 | 16 | 3.7 | 2.9 | 3.3 | 3.6 | 3.0 | 2.9 | 2.8 | 3.1 | 3.5 |
| Software International | | | | | | | | | | |
| Accounts Payable | 11 | 2.9 | 2.5 | 2.2 | 2.7 | 2.2 | 2.4 | 2.4 | 2.4 | 2.6 |
| General Ledger | 58 | 3.3 | 2.8 | 2.7 | 2.9 | 2.5 | 2.6 | 2.7 | 2.5 | 2.9 |
| MRP | 4 | 3.0 | 2.5 | 2.5 | 2.5 | 2.5 | 1.5 | 2.5 | 2.5 | 2.3 |
| Payroll | 5 | 2.0 | 2.4 | 2.2 | 2.2 | 1.8 | 2.0 | 1.8 | 2.0 | 2.0 |
| Software Pursuits | | | | | | | | | | |
| DOS MVT | 9 | 3.6 | 3.8 | 3.3 | 3.6 | 3.2 | 2.4 | 2.3 | 3.3 | 3.4 |
| Systems Research Inc | | | | | | | | | | |
| SRI Edit | 4 | 3.8 | 3.5 | 3.8 | 4.0 | 3.3 | 3.0 | 3.0 | 3.5 | 3.8 |

LEGEND Mean average user ratings for each package, as tabulated above, were calculated on a scale of 4 for each user rating of Excellent, 3 for Good, 2 for Fair, and 1 for Poor

Separate cluster analyses were then made of the mean average user ratings for all packages rated by three or more respondents These cluster analyses were used to determine the ranges of mean average user ratings which can be interpreted as being in the highest cluster, the second, the third, and the fourth or lowest cluster for each characteristic The mean averages which fall into each cluster group for each characteristic are listed at the bottom of the facing page The resulting hierarchical cluster groupings for each package are tabulated on the facing page

REPRODUCED WITH PERMISSION

| Vendor and Package Name | No. of User Ratings Received | Hierarchical Cluster Groupings | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Reliability | Efficiency | Ease of Installation | Ease of Use | Vendor's Technical Support | | | Vendor's Maintenance | Overall Satisfaction |
| | | | | | | Trouble Shooting | Documentation | User Education | | |
| S A B Inc | | | | | | | | | | |
| Software 1040 | 9 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Saddlebrook | | | | | | | | | | |
| Financial | 4 | 2 | 1 | 2 | 2 | 2 | 2 | 1 | 2 | 2 |
| General Ledger | 3 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 1 |
| SAS Institute | | | | | | | | | | |
| SAS | 68 | 1 | 1 | 1 | 2 | 2 | 2 | 1 | 2 | 1 |
| Saturn Systems | | | | | | | | | | |
| Saturn WP | 4 | 1 | 1 | 2 | 2 | 3 | 2 | 2 | 3 | 2 |
| Scientific Management | | | | | | | | | | |
| IDOL | 3 | 1 | 2 | 2 | 2 | 2 | 3 | 3 | 2 | 2 |
| SDA Products | | | | | | | | | | |
| Intercomm | 4 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| Score | 3 | 2 | 2 | 1 | 2 | 2 | 2 | 2 | 2 | 2 |
| SDI | | | | | | | | | | |
| Epat | 17 | 1 | 1 | 2 | 2 | 3 | 2 | 2 | 3 | 2 |
| Grasp | 4 | 3 | 1 | 2 | 2 | 3 | 2 | 2 | 3 | 2 |
| Reach | 3 | 3 | 2 | 2 | 1 | 3 | 2 | 2 | 3 | 2 |
| S & H Computer Leasing | | | | | | | | | | |
| TSX | 8 | 2 | 1 | 1 | 1 | 3 | 2 | 3 | 3 | 2 |
| Shaw Associates | | | | | | | | | | |
| CL70 | 5 | 3 | 3 | 3 | 3 | 2 | 2 | 2 | 3 | 2 |
| Signal Technology | | | | | | | | | | |
| PACS | 3 | 4 | 3 | 2 | 3 | 4 | 3 | 3 | 3 | 3 |
| Software AG of N.A | | | | | | | | | | |
| Adabas | 4 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Complete | 5 | 2 | 2 | 2 | 2 | 3 | 2 | 3 | 2 | 2 |
| Natural | 7 | 2 | 2 | 1 | 1 | 2 | 3 | 2 | 3 | 1 |
| Software House | | | | | | | | | | |
| System 1022 | 16 | 1 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 1 |
| Software International | | | | | | | | | | |
| Accounts Payable | 11 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| General Ledger | 58 | 2 | 2 | 2 | 2 | 3 | 3 | 2 | 3 | 2 |
| MRP | 4 | 3 | 3 | 3 | 3 | 3 | 4 | 2 | 3 | 3 |
| Payroll | 5 | 4 | 3 | 3 | 3 | 4 | 3 | 3 | 3 | 4 |
| Software Pursuits | | | | | | | | | | |
| DOS MVT | 9 | 2 | 1 | 2 | 2 | 2 | 3 | 3 | 2 | 1 |
| Systems Research Inc. | | | | | | | | | | |
| SRI Edit | 4 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 1 |
| NOTE The range of average user ratings attributed to each cluster for each characteristic is as follows | | | | | | | | | | |
| Cluster 1 | | 3.66 to 4.00 | 3.27 to 4.00 | 3.39 to 4.00 | 3.62 to 4.00 | 3.60 to 4.00 | 3.50 to 4.00 | 3.10 to 4.00 | 3.66 to 4.00 | 3.39 to 4.00 |
| Cluster 2 | | 3.08 to 3.65 | 2.66 to 3.26 | 2.66 to 3.38 | 2.85 to 3.61 | 2.69 to 3.59 | 2.70 to 3.49 | 2.50 to 3.09 | 2.88 to 3.65 | 2.70 to 3.38 |
| Cluster 3 | | 2.50 to 3.07 | 2.00 to 2.65 | 1.66 to 2.65 | 2.00 to 2.84 | 2.14 to 2.68 | 2.00 to 2.69 | 1.60 to 2.49 | 2.00 to 2.87 | 2.14 to 2.69 |
| Cluster 4 | | Below 2.50 | Below 2.00 | Below 1.66 | Below 2.00 | Below 2.14 | Below 2.00 | Below 1.60 | Below 2.00 | Below 2.14 |

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# Users Rate Their Software

## Proprietary Software: User Ratings and Cluster Analysis

### Mean Average User Ratings

| Vendor and Package Name | No. of User Ratings Received | Reliability | Efficiency | Ease of Installation | Ease of Use | Vendor's Technical Support | | | Vendor's Maintenance | Overall Satisfaction |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Trouble Shooting | Documentation | User Education | | |
| Software Solutions Script | 3 | 4.0 | 3.3 | 3.3 | 3.0 | 2.7 | 3.0 | 1.5 | 3.0 | 3.3 |
| Softech Microsystems USCD Pascal | 3 | 3.7 | 3.3 | 3.3 | 3.7 | 2.5 | 3.0 | 2.5 | 4.0 | 3.3 |
| Southeastern Comp. Serv TACS | 3 | 2.7 | 2.3 | 3.0 | 3.0 | 1.7 | 1.7 | 2.0 | 2.0 | 2.3 |
| SPSS Inc SPSS | 47 | 3.6 | 3.0 | 3.4 | 3.2 | 3.0 | 3.4 | 2.9 | 3.2 | 3.3 |
| Stockholder Systems Inc. PEP | 3 | 3.7 | 3.0 | 3.0 | 3.3 | 3.0 | 3.0 | 3.0 | 2.7 | 3.3 |
| Structured Systems NADS | 4 | 3.5 | 2.5 | 2.5 | 2.5 | 3.0 | 2.7 | 2.0 | 3.0 | 2.5 |
| Syncsort Inc Syncsort | 97 | 3.8 | 3.8 | 3.6 | 3.7 | 3.4 | 3.3 | 3.0 | 3.4 | 3.6 |
| Synergistics Data Catalog 2 | 3 | 3.0 | 2.7 | 2.7 | 3.0 | 2.0 | 3.0 | 2.5 | 1.5 | 3.0 |
| System Support Software Quikjob | 14 | 3.6 | 3.6 | 3.5 | 3.5 | 3.3 | 3.1 | 2.9 | 3.3 | 3.4 |
| Systems Unique Screen Development | 3 | 3.3 | 3.3 | 3.3 | 3.3 | 3.3 | 3.3 | 2.7 | 3.3 | 3.3 |
| Tandem Enform | 3 | 3.7 | 2.0 | 3.3 | 3.0 | 2.5 | 2.3 | 1.7 | 3.0 | 2.7 |
| Tektronix Plot 10 | 6 | 3.3 | 3.0 | 2.5 | 3.2 | 3.3 | 3.3 | 3.0 | 3.2 | 3.2 |
| Texas Instruments DX10 | 5 | 4.0 | 3.4 | 3.4 | 3.6 | 3.4 | 3.4 | 2.8 | 2.6 | 3.6 |
| Timberline Systems | | | | | | | | | | |
| Accounting | 3 | 4.0 | 3.0 | 3.0 | 3.0 | 2.7 | 2.7 | 3.5 | 2.7 | 3.0 |
| General Ledger | 3 | 4.0 | 3.7 | 4.0 | 4.0 | 3.7 | 3.7 | 3.7 | 3.3 | 3.7 |
| MAC | 4 | 3.5 | 3.3 | 2.8 | 3.3 | 2.5 | 2.8 | 1.8 | 3.3 | 3.3 |
| Payroll | 3 | 3.7 | 3.3 | 3.0 | 3.3 | 3.0 | 3.3 | 3.3 | 3.3 | 3.3 |
| Tomark Abend Aid | 13 | 3.8 | 3.7 | 3.6 | 3.9 | 3.6 | 3.3 | 2.5 | 3.4 | 3.6 |
| TOSC International TOSC 4 | 5 | 3.8 | 3.5 | 3.2 | 3.4 | 3.6 | 3.0 | 2.6 | 3.3 | 3.5 |
| Tower Systems D FAST | 8 | 3.6 | 3.4 | 3.6 | 3.6 | 3.0 | 3.0 | 2.9 | 2.9 | 3.3 |

LEGEND Mean average user ratings for each package as tabulated above were calculated on a scale of 4 for each user rating of Excellent 3 for Good 2 for Fair and 1 for Poor

Separate cluster analyses were then made of the mean average user ratings for all packages rated by three or more respondents These cluster analyses were used to determine the ranges of mean average user ratings which can be interpreted as being in the highest cluster the second the third and the fourth or lowest cluster for each characteristic The mean averages which fall into each cluster group for each characteristic are listed at the bottom of the facing page The resulting hierarchical cluster groupings for each package are tabulated on the facing page

REPRODUCED WITH PERMISSION

### Hierarchical Cluster Groupings

| Vendor and Package Name | No. of User Ratings Received | Reliability | Efficiency | Ease of Installation | Ease of Use | Vendor's Technical Support | | | Vendor's Maintenance | Overall Satisfaction |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Trouble Shooting | Documentation | User Education | | |
| Software Solutions Script | 3 | 1 | 1 | 2 | 2 | 2 | 2 | 4 | 2 | 2 |
| Softech Microsystems USCD Pascal | 3 | 1 | 1 | 2 | 1 | 3 | 2 | 2 | 1 | 2 |
| Southeastern Comp. Serv. TACS | 3 | 3 | 3 | 2 | 2 | 4 | 4 | 3 | 3 | 3 |
| SPSS Inc SPSS | 47 | 2 | 2 | 1 | 2 | 2 | 2 | 2 | 2 | 2 |
| Stockholder Systems Inc PEP | 3 | 1 | 2 | 2 | 2 | 2 | 2 | 2 | 3 | 2 |
| Structured Systems NADS | 4 | 2 | 3 | 3 | 3 | 2 | 2 | 3 | 2 | 3 |
| Syncsort Inc Syncsort | 97 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 1 |
| Synergistics Data Catalog 2 | 3 | 3 | 2 | 2 | 2 | 4 | 2 | 2 | 4 | 2 |
| System Support Software Quikjob | 14 | 2 | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 1 |
| Systems Unique Screen Development | 3 | 2 | 1 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Tandem Enform | 3 | 1 | 3 | 2 | 2 | 3 | 3 | 3 | 2 | 2 |
| Tektronix Plot-10 | 6 | 2 | 2 | 3 | 2 | 2 | 2 | 2 | 2 | 2 |
| Texas Instruments DX10 | 5 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 3 | 1 |
| Timberline Systems | | | | | | | | | | |
| Accounting | 3 | 1 | 2 | 2 | 2 | 2 | 2 | 1 | 3 | 2 |
| General Ledger | 3 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 1 |
| MAC | 4 | 2 | 1 | 2 | 2 | 3 | 2 | 3 | 2 | 2 |
| Payroll | 3 | 1 | 1 | 2 | 2 | 2 | 2 | 1 | 2 | 2 |
| Tomark Abend-Aid | 13 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 1 |
| TOSC International TOSC 4 | 5 | 1 | 1 | 2 | 2 | 1 | 2 | 2 | 2 | 1 |
| Tower Systems D FAST | 8 | 2 | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 2 |

| NOTE The range of average user ratings attributed to each cluster for each characteristic is as follows | Reliability | Efficiency | Ease of Installation | Ease of Use | Trouble Shooting | Documentation | User Education | Vendor's Maintenance | Overall Satisfaction |
|---|---|---|---|---|---|---|---|---|---|
| Cluster 1 | 3.66 to 4.00 | 3.27 to 4.00 | 3.39 to 4.00 | 3.62 to 4.00 | 3.60 to 4.00 | 3.50 to 4.00 | 3.10 to 4.00 | 3.66 to 4.00 | 3.39 to 4.00 |
| Cluster 2 | 3.08 to 3.65 | 2.66 to 3.26 | 2.66 to 3.38 | 2.85 to 3.61 | 2.69 to 3.59 | 2.70 to 3.49 | 2.50 to 3.09 | 2.88 to 3.65 | 2.70 to 3.38 |
| Cluster 3 | 2.50 to 3.07 | 2.00 to 2.65 | 1.66 to 2.65 | 2.00 to 2.84 | 2.14 to 2.68 | 2.00 to 2.69 | 1.60 to 2.49 | 2.00 to 2.87 | 2.14 to 2.69 |
| Cluster 4 | Below 2.50 | Below 2.00 | Below 1.66 | Below 2.00 | Below 2.14 | Below 2.00 | Below 1.60 | Below 2.00 | Below 2.14 |

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# Users Rate Their Software

## Proprietary Software: User Ratings and Cluster Analysis

### Mean Average User Ratings

| Vendor and Package Name | No. of User Ratings Received | Reliability | Efficiency | Ease of Installation | Ease of Use | Vendor's Technical Support: Trouble Shooting | Vendor's Technical Support: Documentation | Vendor's Technical Support: User Education | Vendor's Maintenance | Overall Satisfaction |
|---|---|---|---|---|---|---|---|---|---|---|
| Transcom Data Systems | | | | | | | | | | |
| Tolas | 3 | 3.7 | 2.7 | 2.7 | 3.0 | 2.7 | 2.3 | 2.0 | 2.7 | 3.3 |
| Tolas II | 3 | 3.3 | 2.7 | 3.0 | 3.3 | 2.3 | 2.3 | 2.3 | 2.5 | 3.0 |
| TSI International | | | | | | | | | | |
| Audit Analyzer | 6 | 3.0 | 2.8 | 2.3 | 3.2 | 2.4 | 2.8 | 2.6 | 2.3 | 2.5 |
| Data Analyzer | 5 | 3.4 | 2.5 | 3.0 | 3.6 | 2.4 | 2.6 | 2.6 | 2.7 | 2.8 |
| Key Master | 7 | 3.0 | 3.1 | 3.0 | 3.0 | 2.7 | 2.1 | 2.5 | 2.4 | 2.7 |
| Task Master | 7 | 3.0 | 2.7 | 2.7 | 2.3 | 2.1 | 2.3 | 2.2 | 2.3 | 2.7 |
| UCLA Health Science | | | | | | | | | | |
| BMDP | 7 | 3.4 | 3.1 | 3.3 | 3.3 | 2.8 | 3.0 | 2.3 | 3.1 | 3.3 |
| Unilogic | | | | | | | | | | |
| Scribe | 3 | 3.7 | 3.0 | 3.5 | 3.7 | 3.0 | 3.0 | 2.3 | 2.5 | 3.7 |
| United Computing Systems | | | | | | | | | | |
| Foresight | 3 | 4.0 | 3.3 | 3.0 | 3.7 | 3.0 | 3.0 | 3.0 | 3.0 | 3.7 |
| Sperry Univac | | | | | | | | | | |
| Accounts Payable | 3 | 3.3 | 3.3 | 3.0 | 3.3 | 2.5 | 3.0 | 3.0 | 2.0 | 3.0 |
| BEM | 8 | 3.8 | 3.0 | 3.6 | 3.3 | 2.8 | 3.0 | 2.6 | 2.6 | 3.3 |
| Cobol | 3 | 3.7 | 3.3 | 3.5 | 3.0 | 2.7 | 2.3 | 2.7 | 2.7 | 3.0 |
| DMS 1100 | 9 | 3.4 | 3.2 | 3.0 | 2.9 | 3.4 | 2.9 | 3.1 | 3.6 | 3.3 |
| ICS 90 | 3 | 3.7 | 3.3 | 3.0 | 3.7 | 2.7 | 3.0 | 3.0 | 2.5 | 3.3 |
| IMS | 3 | 3.3 | 3.0 | 3.7 | 3.7 | 3.3 | 3.0 | 2.7 | 2.7 | 3.0 |
| Mapper | 3 | 4.0 | 3.3 | 3.3 | 3.3 | 3.3 | 1.7 | 2.3 | 3.0 | 3.3 |
| Payroll | 5 | 3.4 | 2.4 | 2.0 | 2.2 | 1.6 | 2.4 | 2.0 | 1.8 | 2.2 |
| Unis | 10 | 3.6 | 2.8 | 2.4 | 3.0 | 2.5 | 2.9 | 2.8 | 2.8 | 2.9 |
| Unis 90 | 3 | 2.7 | 2.3 | 1.7 | 2.0 | 1.3 | 2.0 | 1.7 | 2.0 | 2.3 |
| University Computing Co | | | | | | | | | | |
| PIPS | 3 | 3.3 | 3.0 | 3.0 | 2.7 | 3.7 | 3.7 | 3.0 | 3.3 | 3.3 |
| Super MICR | 3 | 3.3 | 3.3 | 2.0 | 3.3 | 2.7 | 2.7 | 2.7 | 2.7 | 3.0 |
| UCC 1 | 34 | 3.7 | 3.4 | 3.0 | 3.3 | 3.1 | 3.0 | 2.9 | 3.2 | 3.4 |
| UCC 10 | 6 | 2.8 | 2.6 | 2.0 | 2.0 | 2.7 | 2.3 | 2.6 | 2.4 | 2.5 |
| UCC 11 | 6 | 3.2 | 3.2 | 2.7 | 2.7 | 2.5 | 2.5 | 2.2 | 3.0 | 2.8 |
| UCC 2 | 3 | 3.7 | 3.3 | 3.5 | 3.7 | 3.0 | 3.0 | 2.3 | 3.0 | 3.3 |
| UCC 7 | 6 | 2.8 | 2.7 | 2.8 | 2.5 | 2.3 | 2.2 | 3.0 | 2.4 | 2.5 |
| UCC FCS | 18 | 3.3 | 2.4 | 2.5 | 2.8 | 2.4 | 3.0 | 3.0 | 2.5 | 2.8 |
| Value Computing Inc | | | | | | | | | | |
| Comput-a-Charge | 4 | 2.5 | 2.0 | 1.3 | 1.5 | 1.8 | 1.3 | 1.7 | 1.5 | 1.5 |
| Value Scheduling | 7 | 2.7 | 2.9 | 2.6 | 2.6 | 2.3 | 1.9 | 2.4 | 2.1 | 2.0 |
| Vector Systems | | | | | | | | | | |
| Execuplan | 3 | 4.0 | 3.3 | 4.0 | 3.0 | 3.0 | 3.5 | 2.5 | 3.0 | 3.3 |
| Versatec | | | | | | | | | | |
| Versaplot | 4 | 3.3 | 2.8 | 2.3 | 3.3 | 2.3 | 2.8 | 2.0 | 1.7 | 2.8 |
| Wang | | | | | | | | | | |
| ISS | 3 | 3.7 | 3.3 | 2.7 | 3.0 | 2.5 | 2.7 | 1.5 | 3.0 | 3.7 |
| Payroll | 6 | 3.7 | 3.2 | 2.3 | 3.0 | 3.0 | 2.8 | 2.7 | 3.0 | 3.0 |
| Super Payroll | 3 | 3.0 | 2.3 | 2.3 | 2.3 | 1.7 | 2.0 | 2.3 | 2.0 | 2.0 |
| WP | 4 | 4.0 | 3.3 | 3.5 | 3.5 | 3.3 | 2.8 | 2.5 | 3.3 | 3.5 |

LEGEND Mean average user ratings for each package, as tabulated above, were calculated on a scale of 4 for each user rating of Excellent, 3 for Good, 2 for Fair, and 1 for Poor

Separate cluster analyses were then made of the mean average user ratings for all packages rated by three or more respondents. These cluster analyses were used to determine the ranges of mean average user ratings which can be interpreted as being in the highest cluster, the second, the third, and the fourth or lowest cluster for each characteristic. The mean averages which fall into each cluster group for each characteristic are listed at the bottom of the facing page. The resulting hierarchical cluster groupings for each package are tabulated on the facing page.

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### Hierarchical Cluster Groupings

| Vendor and Package Name | No. of User Ratings Received | Reliability | Efficiency | Ease of Installation | Ease of Use | Vendor's Technical Support: Trouble Shooting | Vendor's Technical Support: Documentation | Vendor's Technical Support: User Education | Vendor's Maintenance | Overall Satisfaction |
|---|---|---|---|---|---|---|---|---|---|---|
| Transcom Data Systems | | | | | | | | | | |
| Tolas | 3 | 1 | 2 | 2 | 2 | 2 | 3 | 3 | 3 | 2 |
| Tolas II | 3 | 2 | 2 | 2 | 2 | 3 | 3 | 3 | 3 | 2 |
| TSI International | | | | | | | | | | |
| Audit Analyzer | 6 | 3 | 2 | 3 | 2 | 3 | 2 | 2 | 3 | 3 |
| Data Analyzer | 5 | 2 | 3 | 2 | 2 | 3 | 3 | 2 | 3 | 2 |
| Key Master | 7 | 3 | 2 | 2 | 2 | 2 | 3 | 2 | 3 | 2 |
| Task Master | 7 | 3 | 2 | 2 | 3 | 4 | 3 | 3 | 3 | 2 |
| UCLA Health Science | | | | | | | | | | |
| BMDP | 7 | 2 | 2 | 2 | 2 | 2 | 2 | 3 | 2 | 2 |
| Unilogic | | | | | | | | | | |
| Scribe | 3 | 1 | 2 | 1 | 1 | 2 | 2 | 3 | 3 | 1 |
| United Computing Systems | | | | | | | | | | |
| Foresight | 3 | 1 | 1 | 2 | 1 | 2 | 2 | 2 | 2 | 1 |
| Sperry Univac | | | | | | | | | | |
| Accounts Payable | 3 | 2 | 1 | 2 | 2 | 3 | 2 | 2 | 3 | 2 |
| BEM | 8 | 1 | 2 | 1 | 2 | 2 | 2 | 2 | 3 | 2 |
| Cobol | 3 | 1 | 1 | 1 | 2 | 2 | 3 | 2 | 3 | 2 |
| DMS 1100 | 9 | 2 | 2 | 2 | 2 | 2 | 2 | 1 | 2 | 2 |
| ICS 90 | 3 | 1 | 1 | 2 | 1 | 2 | 2 | 2 | 3 | 2 |
| IMS | 3 | 2 | 2 | 1 | 1 | 2 | 2 | 2 | 3 | 2 |
| Mapper | 3 | 1 | 1 | 2 | 2 | 2 | 4 | 3 | 2 | 2 |
| Payroll | 5 | 2 | 3 | 3 | 3 | 4 | 3 | 3 | 4 | 3 |
| Unis | 10 | 2 | 2 | 3 | 2 | 3 | 2 | 2 | 3 | 2 |
| Unis 90 | 3 | 3 | 3 | 3 | 3 | 4 | 3 | 3 | 3 | 3 |
| University Computing Co | | | | | | | | | | |
| PIPS | 3 | 2 | 2 | 2 | 3 | 1 | 1 | 2 | 2 | 2 |
| Siper MICR | 3 | 2 | 1 | 3 | 2 | 2 | 2 | 2 | 3 | 2 |
| UCC 1 | 34 | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 2 | 1 |
| UCC 10 | 6 | 3 | 3 | 3 | 3 | 2 | 3 | 2 | 3 | 3 |
| UCC 11 | 6 | 2 | 2 | 2 | 3 | 3 | 3 | 3 | 2 | 2 |
| UCC 2 | 3 | 1 | 1 | 1 | 1 | 2 | 2 | 3 | 2 | 2 |
| UCC 7 | 6 | 3 | 2 | 2 | 3 | 3 | 3 | 2 | 3 | 3 |
| UCC FCS | 18 | 2 | 3 | 3 | 3 | 3 | 2 | 2 | 3 | 2 |
| Value Computing Inc | | | | | | | | | | |
| Comput-a-Charge | 4 | 3 | 3 | 4 | 4 | 4 | 4 | 3 | 4 | 4 |
| Value Scheduling | 7 | 3 | 2 | 3 | 3 | 3 | 4 | 3 | 3 | 4 |
| Vector Systems | | | | | | | | | | |
| Execuplan | 3 | 1 | 1 | 1 | 2 | 2 | 1 | 2 | 2 | 2 |
| Versatec | | | | | | | | | | |
| Versaplot | 4 | 2 | 2 | 3 | 2 | 3 | 2 | 3 | 4 | 2 |
| Wang | | | | | | | | | | |
| ISS | 3 | 1 | 1 | 2 | 2 | 3 | 2 | 4 | 2 | 1 |
| Payroll | 6 | 1 | 2 | 3 | 2 | 2 | 2 | 2 | 2 | 2 |
| Super Payroll | 3 | 3 | 3 | 3 | 3 | 4 | 3 | 3 | 3 | 4 |
| WP | 4 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 1 |

NOTE The range of average user ratings attributed to each cluster for each characteristic is as follows

| | Reliability | Efficiency | Ease of Installation | Ease of Use | Trouble Shooting | Documentation | User Education | Vendor's Maintenance | Overall Satisfaction |
|---|---|---|---|---|---|---|---|---|---|
| Cluster 1: | 3.66 to 4.00 | 3.27 to 4.00 | 3.39 to 4.00 | 3.62 to 4.00 | 3.60 to 4.00 | 3.50 to 4.00 | 3.10 to 4.00 | 3.66 to 4.00 | 3.39 to 4.00 |
| Cluster 2: | 3.08 to 3.65 | 2.66 to 3.26 | 2.66 to 3.38 | 2.85 to 3.61 | 2.69 to 3.59 | 2.70 to 3.49 | 2.50 to 3.09 | 2.88 to 3.65 | 2.70 to 3.38 |
| Cluster 3 | 2.50 to 3.07 | 2.00 to 2.65 | 1.66 to 2.65 | 2.00 to 2.84 | 2.14 to 2.68 | 2.00 to 2.69 | 1.60 to 2.49 | 2.00 to 2.87 | 2.14 to 2.69 |
| Cluster 4 | Below 2.50 | Below 2.00 | Below 1.66 | Below 2.00 | Below 2.14 | Below 2.00 | Below 1.60 | Below 2.00 | Below 2.14 |

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# Users Rate Software

## Proprietary Software: User Ratings and Cluster Analysis

| Vendor and Package Name | No. of User Ratings Received | Mean Average User Ratings | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Reliability | Efficiency | Ease of Installation | Ease of Use | Vendor's Technical Support | | | Vendor's Maintenance | Overall Satisfaction |
| | | | | | | Trouble Shooting | Documentation | User Education | | |
| Weiland | | | | | | | | | | |
| DDA | 8 | 3.0 | 2.6 | 2.3 | 2.9 | 2.0 | 2.6 | 2.3 | 2.0 | 2.6 |
| Western Electric Co | | | | | | | | | | |
| Unix | 16 | 3.4 | 3.4 | 3.4 | 3.6 | 1.9 | 2.5 | 1.7 | 1.5 | 3.1 |
| Westinghouse | | | | | | | | | | |
| Disk Space Manager | 6 | 3.3 | 3.5 | 3.5 | 3.2 | 3.0 | 3.0 | 2.7 | 3.3 | 3.2 |
| FDR | 6 | 3.8 | 3.8 | 3.8 | 3.8 | 3.5 | 3.5 | 3.3 | 3.0 | 3.8 |
| Westi | 8 | 3.8 | 3.6 | 3.4 | 3.5 | 3.5 | 3.1 | 3.0 | 3.3 | 3.3 |
| WHSE Disk Utility | 8 | 3.5 | 3.4 | 3.5 | 3.5 | 3.4 | 3.1 | 2.6 | 3.4 | 3.5 |
| Whitesmiths | | | | | | | | | | |
| C Compiler | 3 | 4.0 | 3.7 | 3.3 | 3.3 | 3.7 | 3.3 | 2.3 | 3.0 | 3.3 |

LEGEND Mean average user ratings for each package, as tabulated above, were calculated on a scale of 4 for each user rating of Excellent, 3 for Good, 2 for Fair, and 1 for Poor.

Separate cluster analyses were then made of the mean average user ratings for all packages rated by three or more respondents. These cluster analyses were used to determine the ranges of mean average user ratings which can be interpreted as being in the highest cluster, the second, the third, and the fourth or lowest cluster for each characteristic. The mean averages which fall into each cluster group for each characteristic are listed at the bottom of the facing page. The resulting hierarchical cluster groupings for each package are tabulated on the facing page.

REPRODUCED WITH PERMISSION

| Vendor and Package Name | No. of User Ratings Received | Hierarchical Cluster Groupings | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Reliability | Efficiency | Ease of Installation | Ease of Use | Vendor's Technical Support | | | Vendor's Maintenance | Overall Satisfaction |
| | | | | | | Trouble Shooting | Documentation | User Education | | |
| Weiland | | | | | | | | | | |
| DDA | 8 | 3 | 3 | 3 | 2 | 4 | 3 | 3 | 3 | 3 |
| Western Electric Co | | | | | | | | | | |
| Unix | 16 | 2 | 1 | 1 | 2 | 4 | 3 | 3 | 4 | 2 |
| Westinghouse | | | | | | | | | | |
| Disk Space Manager | 6 | 2 | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 2 |
| FDR | 6 | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 2 | 1 |
| Westi | 8 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 2 |
| WHSE Disk Utility | 8 | 2 | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 1 |
| Whitesmiths | | | | | | | | | | |
| C Compiler | 3 | 1 | 1 | 2 | 2 | 1 | 2 | 3 | 2 | 2 |

NOTE The range of average user ratings attributed to each cluster for each characteristic is as follows.

| | Reliability | Efficiency | Ease of Installation | Ease of Use | Trouble Shooting | Documentation | User Education | Vendor's Maintenance | Overall Satisfaction |
|---|---|---|---|---|---|---|---|---|---|
| Cluster 1 | 3.66 to 4.00 | 3.27 to 4.00 | 3.39 to 4.00 | 3.62 to 4.00 | 3.60 to 4.00 | 3.50 to 4.00 | 3.10 to 4.00 | 3.66 to 4.00 | 3.39 to 4.00 |
| Cluster 2 | 3.08 to 3.65 | 2.66 to 3.26 | 2.66 to 3.38 | 2.85 to 3.61 | 2.69 to 3.59 | 2.70 to 3.49 | 2.50 to 3.09 | 2.88 to 3.65 | 2.70 to 3.38 |
| Cluster 3 | 2.50 to 3.07 | 2.00 to 2.65 | 1.66 to 2.65 | 2.00 to 2.84 | 2.14 to 2.68 | 2.00 to 2.69 | 1.60 to 2.49 | 2.00 to 2.87 | 2.14 to 2.69 |
| Cluster 4 | Below 2.50 | Below 2.00 | Below 1.66 | Below 2.00 | Below 2.14 | Below 2.00 | Below 1.60 | Below 2.00 | Below 2.14 |

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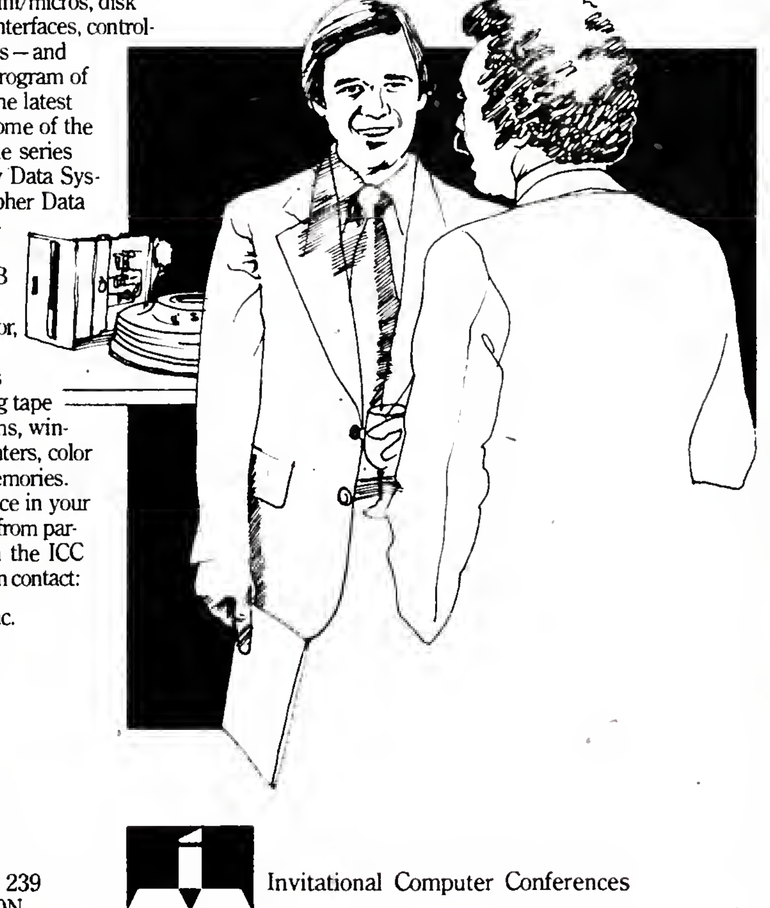

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# EDITORIAL

## Prosperous Neighbors

At year's end, construction proceeds on two skyscrapers along Manhattan's Madison Avenue. One will house much of IBM's corporate headquarters; the other, just across the street, will contain AT&T's corporate headquarters.

As the framework for these buildings rises toward the skies where communications satellites now ferry both data and voice traffic for businesses, the world's largest computer manufacturer and the world's largest telecommunications supplier seem like prosperous neighbors.

A humming community of peripheral vendors, software houses, systems integrators, subsystem developers and service bureaus draw sustenance from both industrial giants.

The construction along Madison Avenue, where so much money is spent on manipulation of minds, seems to symbolize the new proximity in core interests of the computing and telecommunications industries, as well as their connecting bottom line: the process by which people can be persuaded to buy.

In computing and telecommunications, users' purchase decisions are generally long-term. In 1981, large companies invested big in systems that will take years to implement; but how much can large companies rely on this year's expectations of what the next few years will bring?

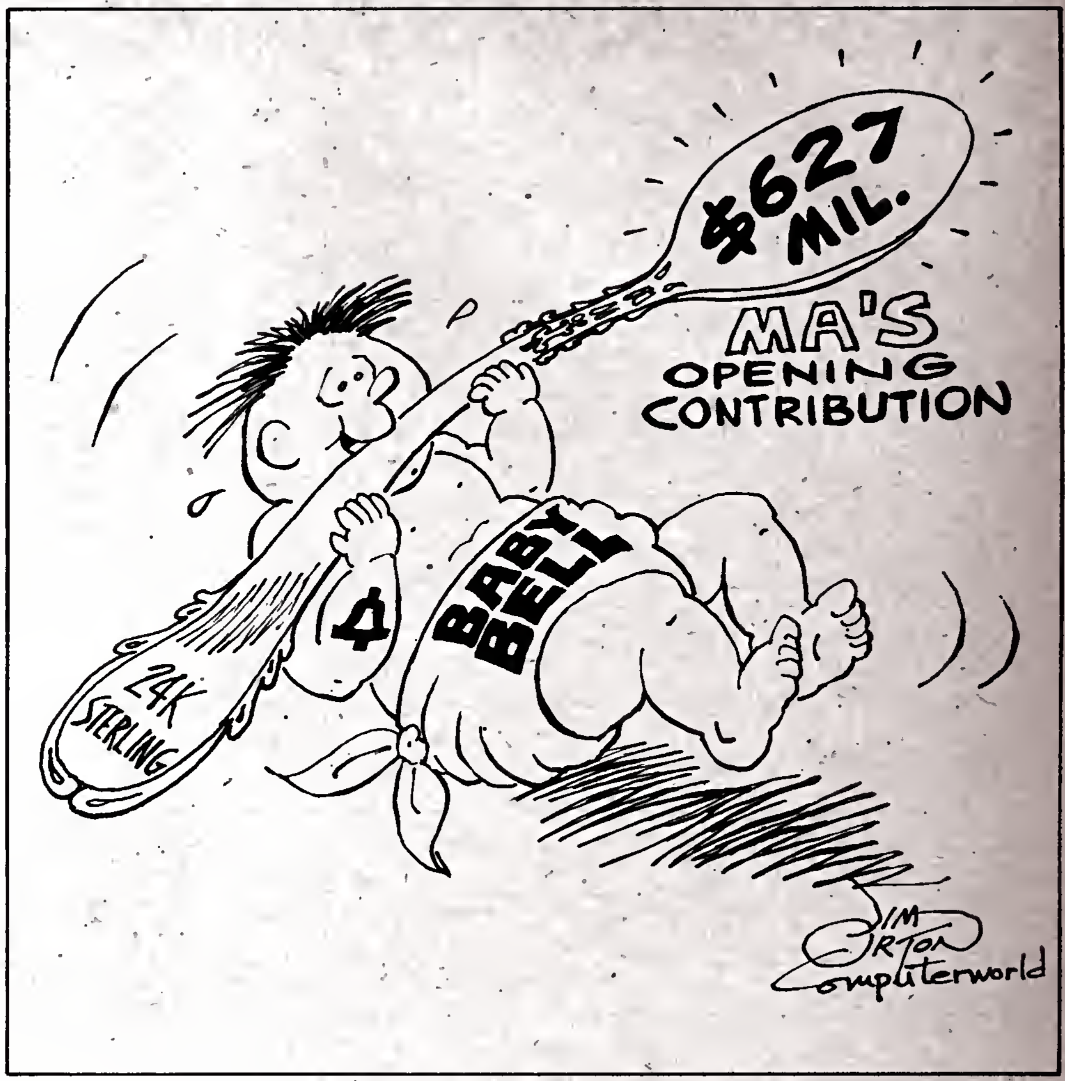
Are IBM and AT&T building on solid ground? Could their corporate towers withstand a tidal wave from Japan? Evidence has mounted this year that Japanese information processing manufacturers could be preparing for a big splash on Madison Avenue, if not Wall Street. But the Japanese threat is concentrated in small systems, which are not the main source of IBM's revenues. IBM has plenty to worry about as 1981 becomes history; the cause for worry is American.

IBM is vulnerable in the market for terminals, which AT&T can enter as never before (thanks to deregulation), the market for controllers of terminals and other peripherals, the market for distributed processors and the market for many kinds of software.

This vulnerability comes from Systems Network Architecture, the foundation for IBM products in data communications and distributed data processing. SNA ties users into virtually sole source dependence on IBM for many kinds of hardware. Most large users have accepted SNA as the price for gaining IBM mainframes. They will not have to pay this price much longer.

Instead, users will gain a new breed of protocols from the U.S. research community (largely unaffiliated with major systems vendors) that will allow smooth data links, bypassing SNA, from IBM large systems to otherwise incompatible hardware made by many different vendors.

These protocols will also reduce common carrier control of the user's communications costs. But IBM is more threatened than AT&T as Madison Avenue bustles beneath two new skyscrapers and a lot of air heavy with information.



# DATA PAST

### Ten Years Ago
### Dec. 22, 1971

NEW YORK — Computers will drop rapidly in price while both memory sizes and speeds increase, but software costs will continue to rise during the 1970s, according to a new study. The industry will see full-scale minicomputer systems priced at under $3,000 by 1975 and optical character recognition units that are well below $20,000 by 1974, the study predicted.

### Five Years Ago
### Dec. 20, 1976

DETROIT — Burroughs Corp. introduced three communications-oriented processors that featured separately priced hardware and software.

The B870 and B860 systems were designed for electronics funds transfer systems and multilocation message switching networks; they were compatible with most existing Burroughs mainframes and terminal systems, according to a spokesman.

# LETTERS

## Important Information

I just wanted to let you know of my unlimited appreciation for your publishing the "Electronics Underworld" reports of Christopher Simpson.

They contained information that I considered to be most important. I know of no other means of getting it except through his perceptive and readily understood articles.

I know of no other investigative reporter who is the equal of Jonathan Kwitny of *The Wall Street Journal*, but Simpson is certainly a close second.

Although part of my duties involve investigative auditing of financial transactions involving life insurance companies, I am not directly affected by any of the things that Simpson has reported or, for that matter, any of the topics that were written about by Ian Fleming. Nevertheless, I attached much importance to the subjects of Simpson's articles.

John B. Reid Jr.
Consultant
Alexander Grant & Co.
Dallas, Texas

## Irritating and Amusing

The reader commentary by Richard Shemtob ["Should Audit Firms Provide DP Services?" CW, Nov. 30] was both irritating and amusing. To criticize Arthur Andersen and Co. just on the basis of an article ["Frugal State Pours Millions Down DP Drain," CW, Nov. 2] based on a "not-yet-released report" was premature and inappropriate.

As for the suggestion that this example shows that the best place for a public accounting firm is in auditing, it is perhaps best dismissed by the fact that this story was of such rarity that it merited front page exposure whereas a story about the accidental erasure of an unreconstructable master file by a DP person would merit only Page 10 coverage.

Also, at the risk of sounding like an employee of Arthur Andersen (to which I have no connection), the company is not just an auditing firm as Shemtob refers to it, but also a well-respected tax and management consulting firm.

Several of Shemtob's remarks struck me as amusingly ironic when I read his commentary.

At one point he states that the Andersen firm "showed a lack of understanding, knowledge and professionalism from a DP point of view," but turns around to slap the public accounting firm's hands when it, like any other employer, "siphons off DP personnel with superior people skills and communicative abilities."

It is difficult to believe that any public accounting firm the size of Arthur Andersen would send only employees with auditing experience (without a material amount of DP experience) and no DP professionals to handle a $2.5 million computer design job.

It appears that the New Hampshire state government was justified in turning to outside independent consultants to design the State Liquor Commission computer system since it did not have enough faith in its own DP personnel to tell them that the system was "outdated, unworkable and inoperable," but had to hire an additional consultant even for that purpose.

Last, it struck me as ironic that Shemtob stated that he was both a CPA and a DP consultant after emphasizing that in most cases it is impossible for auditors to "become DP experts as well as audit experts." Perhaps the exception rather than the rule should be applied to both the Arthur Andersen case and Shemtob's.

David Harrison, CPA
DP Audit Supervisor
Commerce Union Bank
Nashville, Tenn.

HUMAN CONNECTION/Jack Stone

# How to Foul Up a System Without Even Trying

Generally speaking, most systems today work okay — albeit only after the project manager has blown the budget on workdays and dollars. Many are off-target, some really aren't very effective and a few are total disasters.

It boggles my mind that after all that has been written about systems development and after all the training in the field, systems monstrosities continue to emerge. Recently I came upon a beauty that was developed in such a way as to virtually guarantee the systems catastrophe that later resulted.

Here was the situation: I received a telephone call from a former client who had been reviewing his information systems. It seems as though one in particular was not working quite up to snuff because in describing it to me, he stated unabashedly, "As far as I can tell, data has been entered into the system for the last two years, but no reports have been generated and I can't find anybody around that understands how to operate the programs."

## Assuring Systems Failure

So I wound up with a consulting task, to try and figure it all out. After studying the system for only a very short time (while attempting to maintain a respectable distance from it), I found in it a development methodology which, if followed to the letter by systems analysts, will assure systems failure.

Here is the approach for the edification of analysts — and their avoidance of it:

*'On another day, the contractor calls to reveal he is out of money, but he does have the approach to the systems design. No great problem to you, as you have some money on hand from a previously canceled project. You allocate 100% overrun funding and take off for vacation.'*

- When the user says, "I trust you — generate the reports any way you see fit and that'll be fine with me," rush off and hire a contractor to handle the work because the spec is so "clean" and you are so busy on higher priority tasks.
- Don't bother to monitor the contractor's efforts too closely since he is so knowledgeable (in other words, he's *really* into IBM JCL and other computer-based antiquities).
- One day, the contractor calls in to report that there is no suitable software to handle the job and that he has to develop a comprehensive data base management package. Even though the DP task is a rather conventional application involving a few calculations and some columnar charts, you don't take the time to think about it, so you give your blessing and go about your other business.
- On another day, the contractor calls to reveal he is out of money, but he does have the approach to the systems design. No great problem to you, as you have some money on hand from a previously canceled project. You allocate 100% overrun funding and take off for vacation.
- Much later, the contractor drops off some reels of tape and a bunch of interim reports. He notes that the development is complete and documented in a JCL listing several yards long. You breeze through the output, commenting, "Looks good to me!" and dump the materials into a box that is hidden in the closet.
- You bring on a new contractor to operate the system and generate production reports. The new man notes that the system is impossible to understand and suggests that he develop a new one. Being in a hurry, you commit the project.
- One day, the contractor calls in to report that there is no suitable software to handle the job and that he has to develop a comprehensive data base management package. You don't take the time to think about it so you give your blessing and go about your business.
- On another day, the contractor calls to reveal he is out of money, but he does have the approach to the systems design. No great problem to you, as you have some money on hand from a previously canceled project. You allocate 100% overrun funding and take off for another vacation.

Much later, the contractor drops off some reels of tape but no reports, notes that the development is incomplete and he has quit for a better job.

*Letters to Stone should be addressed to him at Box 207, 1377 K St., N.W., Washington, D.C. 20005.*

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READER COMMENTARY/Jon R. David

# Help Wanted: Criteria for Evaluating Computers

Twenty and more years ago the primary uses of computers involved computing. The length of a computer's word size determined the accuracy one could obtain with single-precision arithmetic.

The number of registers impacted the number of operations one could execute without having to use memory reference instructions, which typically took twice as long as register instructions. The number of available asynchronous I/O channels were a direct measure of a computer's maximum data rate. The presence or absence of individual machine instructions could be a determining factor in particular applications.

When used as computing machines, computers typically took a few internal numbers and performed tens or hundreds of thousands of mathematical operations on them each second or two or accepted a high-speed burst of data from an external source. The difference between using one cycle or two cycles for instructions could be a two-to-one performance difference. Single- or double-precision arithmetic could impact performance by a 10:1 ratio. The users of the early computers were primarily engineers and they knew how to determine which computer was best — in other words, fastest, most accurate and so on.

Today we have seen computers evolve from computing devices through data processors to information processors. Applications have evolved from aerospace through large corporate accounting to small business operations. Users have evolved from engineers through accounting heads to small businessmen. Engineers worked directly with computers, large corporate accounting heads worked with computers through operating systems and higher level languages and small businessmen today only see the results of turnkey systems or canned software.

Yesterday's best no longer has meaning, but the man in the street interested in computers still wants some measure of capacity and capability to measure one computer against another.

*'I believe you will be more comfortable with this concept and see its true applicability when you recall how many management information systems managers are clucks and how many systems lay eggs!'*

End users are quoted kilobytes of main memory, megabytes of disk and the like from hosts of vendors, each the sole source of the best computer. These are quantitative items and therefore seem ideal for comparison. But, do they have meaning?

Computer A offers only 100M bytes of disk, while computer B offers 300. An end user would probably feel B is three times better than A. If, however, when disk A is formatted it yields 90 available megabytes and a formatted B yields only 150M bytes, the 3:1 ratio is more than halved.

Taking this one step further, if the operating system and languages standard with A allow blocking of 1,000-byte-sectors and the B software does not allow blocking, an application with 100-byte records would be able to store 900,000 records with the A disk, but only 150,000 with the B disk. The B disk, quoted at three times the capacity of the A disk, winds up holding only one-sixth of the data. Similar examples, all realistic, could be made for machines with large quoted memory having most of that memory devoted to required operating systems — machines with short execution cycles taking an abnormally number of cycles to execute programs and the like.

Obviously, only those truly expert in virtually all aspects of computers and computing will have a chance of determining the best, most, fastest, biggest or other superlatives. Oddly enough, this is no great loss.

The computers of today have their primary use as information movers, not as computing devices. There exists a true measure of a computer's ability to move data — its bandwidth. This bandwidth, measured in hertz (kilohertz and megahertz), is independent of those subtleties that can so easily deceive all but the more expert. Hertz as a unit of measure, though, is a bit abstract and most users would find it meaningless. Therefore, while hertz is sufficient from a scientific point of view, human factors engineering dictates more humanization of this unit of measure.

Even people who know nothing about cars can evaluate relative automotive power with the unit of horsepower. Similarly, explosive capability in megatons (of dynamite), illumination in candle power and the like help people measure competing devices. What, then, for bandwidth and hertz?

The *New York Times*, in its July 1, 1980 issue, has an article by Bayard Webster, which points out that chickens talk to eggs ("cluck") at a 2 kHz frequency and eggs talk to chickens ("peep") at a 4 kHz frequency. I propose that the "chick," equal to 2 kHz, be used as our measurement of true computer capacity.

For example, what is now a 4 MHz computer would be viewed as a 2 kilochick machine. As computers become able to handle data measured in billions of hertz, we would get megachick machines. (If you prefer the "peep" to the "chick," the peep/kilopeep/megapeep to chick/kilochick/megachick conversion is exactly one to two, much easier than the inches/quarts/to meters/liter/conversions we are now going through.)

Although this may seem a bit difficult to accept on first reading; think about it. I believe you will be more comfortable with this concept and see its true applicability when you recall how many management information systems managers are clucks and how many systems lay eggs!

*David is a management consultant based in Orangeburg, N.Y.*

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### *Employs Productivity Tools*

# IBM System/3 Upgrade Seen 'Painless'

CUPERTINO, Calif. — Even though it is currently converting from an IBM System/3 to an IBM 4341 running under OS/VS1, a company here is not going to rewrite its more than 600 batch and 120 on-line RPG programs, nor is it going to add more staff.

The conversion will be a relatively painless process, according to Measurex Corp., because it employs productivity tools designed to eliminate the necessity to rewrite programs designed for different systems architectures.

Measurex is a producer of sensor-based computer process control systems used in continuous process industries; it also produces energy control systems to optimize energy usage in industrial plants. The company selected Insac Software, Inc.'s CPG — the language that allows programs written for communications control programs (CCP) to run under CICS and OS/RPG, enabling existing batch programs written in RPG-II to run under OS.

### Response-Time Problems

Robert Stucky, director of corporate management information systems at Measurex, explained, "Because of business growth we were out of capacity on our IBM System/3-15D, and we were beginning to experience severe on-line response-time problems and untimely completion of batch processing. We were limited in terms of how frequently we could run certain applications, especially MRP [Material Requirements Planning] applications." These systems are critical, so the problem had to be solved.

A replacement of the old computer with an IBM 4341, running an OS operating system, was chosen to meet near-term capacity needs and provide for future growth through field upgrades. The existing applications systems consisting of 120 on-line and 600 batch programs written in RPG, plus about 200 Cobol programs, had to operate on the new computer.

"Since RPG-II does not run under OS," Stucky said, "our choices were fairly clear: completely rewrite our RPG systems or find a product that enabled us to run our RPG-based systems under OS.

"The rewrite would have cost us an additional two programmers for the batch programs and two for the on-line programs for nine months. That's more than 5,000 person-hours and better than $75,000 in salaries and benefits for the nine-month conversion period," he said.

### Maintaining Staff Size

To Measurex, the major benefit of utilizing the OS/RPG and CPG products was being able to convert systems with the same number of people that they would need for new development after conversion. "Not having to bring in a peak staff is very important to me," Stucky said.

"Had we not found CPG and OS/RPG we would have had to overstaff during conversion [temporary assistance being difficult to find] or contract a certain amount of the work out, which in our case would have been a very expensive way to proceed," Stucky said.

"The only other alternative was to extend the conversion effort over a longer period of time, and that would not have met our near-term need for additional computer capacity."

Measurex evaluated three packages that simplify batch systems conversion. OS/RPG, marketed by Policy Management Systems Corp. in Columbia, S.C., was chosen because of its price and performance over that of the alternatives. "When we first started evaluating our conversion effort," Stucky said, "we were unable to find a product capable of doing what CPG does."

He said he received a call while on a business trip in Europe from his firm's systems development and DP operations managers in Cupertino when they first heard about Insac Software's product. "They were excited to have found a product to help us avoid the rewriting of our on-line systems."

In addition to the time and personnel savings, Stucky expects a savings in CPU cycles with CPG because of its architecture.

Herb Swanson, DP operations manager, said CPG's interface protects the applications programmer from causing CICS abends to a much greater level than Cobol can handle them. He added that CPG allows conversion of RPG programs from CCP to CICS with minimal changes.

"With the RPG expertise of our staff, both products fit our needs perfectly and came at just the right time," Swanson explained.

# CSTS, IBM-Based Services Expanded Through Infonet Net

EL SEGUNDO, Calif. — Computer Sciences Corp. has upgraded its Infonet remote computing network with the use of larger computers and a new operating system — the Computer Sciences Teleprocessing System II (CSTS II).

In addition to the upgraded CSTS service, Computer Sciences announced it is expanding the IBM-based services it provides through the Infonet communications network.

The vendor also introduced an intelligent terminal designed to extend the range of distributed processing services of its Infonet computing network.

The company reported it is replacing the 16 Sperry Univac 1108 systems in its four North American data centers with six Univac 1100/80 series machines. The first two already are operating in Infonet's Beltsville, Md., center. Two more, installed in the Los Angeles center, will begin service in late December.

The replacement program is scheduled for completion by March 1984, the vendor said, noting that the upgrade is intended to enable users to run larger tasks in less time than before.

In addition, more users will be able to access a common data base, according to Computer Sciences. Other systems features reportedly will provide improved language and data management functions, greater tape density and higher hardware reliability.

CSTS II was designed as an upward-compatible operating system, the vendor said, noting that most user programs can run on CSTS II without modification.

### Front-End Unit

The intelligent terminal unveiled by Computer Sciences is designated the IS50 and reportedly is intended as a front-end processor to Infonet. The vendor noted it also can be used for local processing and storage and for word processing.

Monthly charges for the terminal are $325 under a two-year commitment agreement, $375 under a one-year agreement and $425 on a month-to-month basis. The price includes standard software and equipment maintenance.

Computer Sciences is headquartered at 650 N. Sepulveda Blvd., El Segundo, Calif. 90245.

# Jasper/CICS Replaces IBM's Monitor For CICS/VS Version 1.5 and Up

JERICHO, N.Y. — Computer Associates International, Inc. has introduced Jasper/CICS to replace the monitor provided for users of IBM's CICS/VS Version 1.5 or greater. Jasper/CICS reportedly will provide more information than the standard performance, accounting and exception records inherent in the native CICS/VS monitor.

This was designed to improve batch reporting capabilities. Computer Associates' Wizard report generator also will be provided with Jasper/CICS, along with 20 prewritten analytical reports to enable CICS/VS users to obtain more information than is available through the use of Gpars, IBM's facility for batch reporting on the native CICS/VS monitor files.

Jasper/CICS also will include real-time performance modeling provided at user-selected interval levels, the vendor continued. Screen formats reportedly will provide immediate information as to CPU utilization of the on-line partition, paging rates, file requests, tasks/sec, journal requests and storage utilization.

For DOS users, Jasper/CICS is available for a single payment of $5,200 for a three-year lease; for OS users, the one-time payment for the three-year lease is $7,800, the vendor said.

Computer Associates International is located at 125 Jericho Tnpk., Jericho, N.Y. 11753.

# Version 1.1 DBMS Fits VAX/VMS

NORTH MIAMI, Fla. — Florida Computer, Inc. has released Version 1.1 of Data Boss/32, which it describes as a relational data base management system for Digital Equipment Corp. VAX/VMS systems.

The vendor also announced the Micrographics Management System (MMS), which was designed to interface, index and retrieve microfiche, aperture cards and microfilm.

The license price for MMS ranges from $10,000 to $55,000, depending on options selected. Version 1.1 of Data Boss/32 is priced between $20,000 and $60,000, also depending on options selected, the vendor said.

The firm is located at 99 N.W. 183rd St., N. Miami, Fla. 33169.

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# TSO/MON Update Features Reporting, Data Collection

VIENNA, Va. — Morino Associates, Inc. announced TSO/MON Release 4.0, which was designed to provide new data collection and reporting features for users of IBM and plug-compatible mainframes running under MVS/SP.

Release 4.0 contains enhancements that are said to provide extended reporting facilities, provide additional measurements, improve response measurement and reporting and improve product documentation, the vendor said.

Enhancements and features reportedly include a malfunction analysis report; integration of the application summary report and the TSO audit report; response options that permit the installation to tailor measurement and distribution of response to suit its installation needs; support for MVS/SP Version 1, Releases 2 and 3; and support for the IBM 3081, the vendor said.

The vendor said TSO/MON can be installed and maintained with IBM's System Modification Program (SMP), Version 4.

It is said to include recording interval synchronization. TSO/MON's documentation includes four new guides: reporting; functional description; planning, installation, operation and maintenance; and system administrator.

The license fee for TSO/MON is $13,400, the vendor said from Suite 602, 8133 Leesburg Pike, Vienna, Va. 22180.

# Use.It Fits DEC VAX-11

CAMBRIDGE, Mass. — An automated systems design methodology for Digital Equipment Corp. VAX-11 users that is intended to provide a logically accurate system design and then generate source code automatically from that design was introduced here by High Order Software, Inc.

Use.It has three main components: Axes, the requirements definition language; the Analyzer, which analyzes the defined requirements to insure completeness and consistency; and the Resource Allocation Tool, which generates source code from the Analyzer output, according to the vendor.

Axes may be regarded as a virtual requirements definition language, the vendor said, because it permits the definition of any system. It can be used for modeling hardware and people systems as well as software systems.

Axes definitions are built-in functional hierarchies, with each lower level of hierarchy representing a further breakdown of the overall function.

### Checks for Consistency

The Analyzer reportedly takes the Axes model and checks it for logical completeness and consistency, the vendor said. It insures that the correct interfaces and data flows are maintained between the functional nodes.

Analyzer then certifies accurate integration by checking for the requirements across mechanisms that have been defined separately and any mechanisms that have been used from the library.

Once the Analyzer has approved the system design, the vendor explained that it passes it to the Resource Allocation Tool for generation of the required machine code or source code ready for compilation, the vendor said.

A complete configuration of Use.It costs $123,000, the vendor said from 806 Massachusetts Ave., Cambridge, Mass. 02139.

"We looked at other security products—and TOP SECRET™ was superior."

*Terry Muskoff, Senior Computer Systems Analyst at a major northeast Ohio utility company*

"When I began reviewing security packages, I read documentation and talked to users of various products on the market — specifically RACF and ACF2. And TOP SECRET came out on top," said Mr. Muskoff. "It is a very impressive package and is superior to RACF and ACF2 in many ways. We are running JES2 and TSO on a 370/165 II and a 3031 with shared DASD; there are 80 TSO terminals for 350 users and we have almost 400 batch applications — and TOP SECRET will secure our entire operation.

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# Productivity Aids Fit IBM VM System

HAWAIIAN GARDENS, Calif. — Real World Software, Inc. here announced Rwscreen and RWSXSPL, which it describes as productivity aids for use with IBM's VM operating system.

Rwscreen was designed to enable user-written executive procedures and programs to employ the features of an IBM 3270 type terminal. Features that Rwscreen reportedly makes available to the executive procedure or program include the ability to define display fields, specify intensity of display, determine which fields were changed by the terminal operator and determine which key was used to terminate the operator input.

RWSXSPL is described by the vendor as an interface module that allows virtual machine users to view systems spool files using standard systems editors. Reader, punch and print spool files can be edited by using RWSXSPL, the vendor said, and the software also can be used as an interface for most user-written editors. A user exit is available with RWSXSPL to enable installation-defined security measures to be implemented.

Rwscreen is available on perpetual lease for $750 for the first CPU and $500 for each subsequent CPU. RWSXSPL is available on perpetual lease for $500 for the first CPU and $350 for each subsequent CPU, the vendor said.

For a limited time, the two programs may be obtained as a single package for $1,100, the vendor said from 12258 212th St., Hawaiian Gardens, Calif. 90716. Owners of Real World Software's VM Monitor and Report System, RWVMSTAT, are entitled to a 10% discount on Rwscreen and RWSXSPL.

# 'Adders' Offers System Support

BOSTON — Adders, a software product designed to provide on-line data entry and system development support to IBM CICS and Altergo Software, Inc. Shadow II users, was announced here by Rendeck Corp.

Adders is said to be a data entry and retrieval system that allows on-line data entry and validation without the need for prior program development. Its program-mapping feature reportedly provides automatic generation of source code for handling screens and terminal I/O operations, the vendor said.

A panels feature also is included to enable users to invoke Adders facilities for use in their own programs, the vendor said.

### Series of Menus

Interactively, Adders uses a series of menus to guide users through on-line data entry and retrieval programs, Rendeck said. The program-mapping feature is said to reduce the time and error involved in programming terminal I/O operations. The panels capability is used by writing a program to run under Adders.

Adders runs under and generates routines for CICS and Shadow II using IBM 3270-type terminals under DOS/VS and DOS/VSE.

It is supplied in two components at a cost of $14,000 for the data entry component and $6,000 for program mapping and panels together. It is available on a 30-day trial basis from the vendor at 5 Faneuil Hall-Marketplace, Boston, Mass. 02109.

# II/AP Tool Fits IBM Mainframes

SAN FRANCISCO — Walker Interactive Products has announced Release 3.0 of its Integrated, Interactive Accounts Payable (II/AP) package for use on IBM and plug-compatible mainframes.

Enhancements to Release 3.0 reportedly have broadened its on-line real-time accounting capabilities. They include encumbrance accounting, cost of funds processing and intercompany accounting, according to the vendor.

Among the operating environments the vendor said Release 3.0 of II/AP supports is IBM's SSX/VSE, IMS/DC, CICS, VM/CMS, IMS, Vsam and DL/1 environments, as well as Software AG's Adabas and Cullinane Datasystem, Inc.'s IDMS.

Release 3.0 of II/AP was designed to integrate with Walker's purchase order and material management packages.

Pricing for the package begins at $30,000, depending upon the operating environment, the vendor said from 100 Mission St., San Francisco, Calif. 94105.

# *Sky Offers Simulator*

LOWELL, Mass. — Sky Computers, Inc. has announced a vector processing software package said to simulate the Sky hardware array processor, Skymnk.

The Mnksim simulator runs on Digital Equipment Corp. PDP-11 and LSI-11 systems using RT-11 or RSX11-M. Mnksim is a vector subroutine library that allows users to perform vector and scalar mathematics along with signal processing functions.

Mnksim costs $30 on RX02 media; other media are slightly higher. Sky Computers can be reached through P.O. Box 8008, Lowell, Mass. 01853.

# How To Get A Good Fit In Softwear

## "Application Packages," A *Computerworld* January 25th Special Report

With software development costs rising ever higher and the supply of experienced programmers becomming ever scarcer, application packages look better and better.

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- Users report their results using certain packages
- What to look for when buying a package
- Changing approach to design and implementation of software packages
- The variety of manufacturing and financial packages available

You'll also get answers to software questions like: How are other companies dealing with decisions about packages? Why have they selected these packages? What motivates an organization to shop outside for software? Has outside software proven less expensive than software developed in-house? How much customizing is required with application packages? Have they relieved some of the pressure caused by shortages of DP personnel? Have these packages enabled users to make better use of their hardware? Are equipment changes necessary to accomodate new software?

We're covering all the questions and you'll get all the answers in this Special Report. So if you're an MIS Executive, DP Manager, Supervisor or Lead Programmer, you'll want to read "Application Packages." And if you market programming products or services, your ad should be there. Ad closing is January 8, and your *Computerworld* salesperson can give you all the details. Or, to reserve space for your ad, call Frank Collins at (617) 879-0700.

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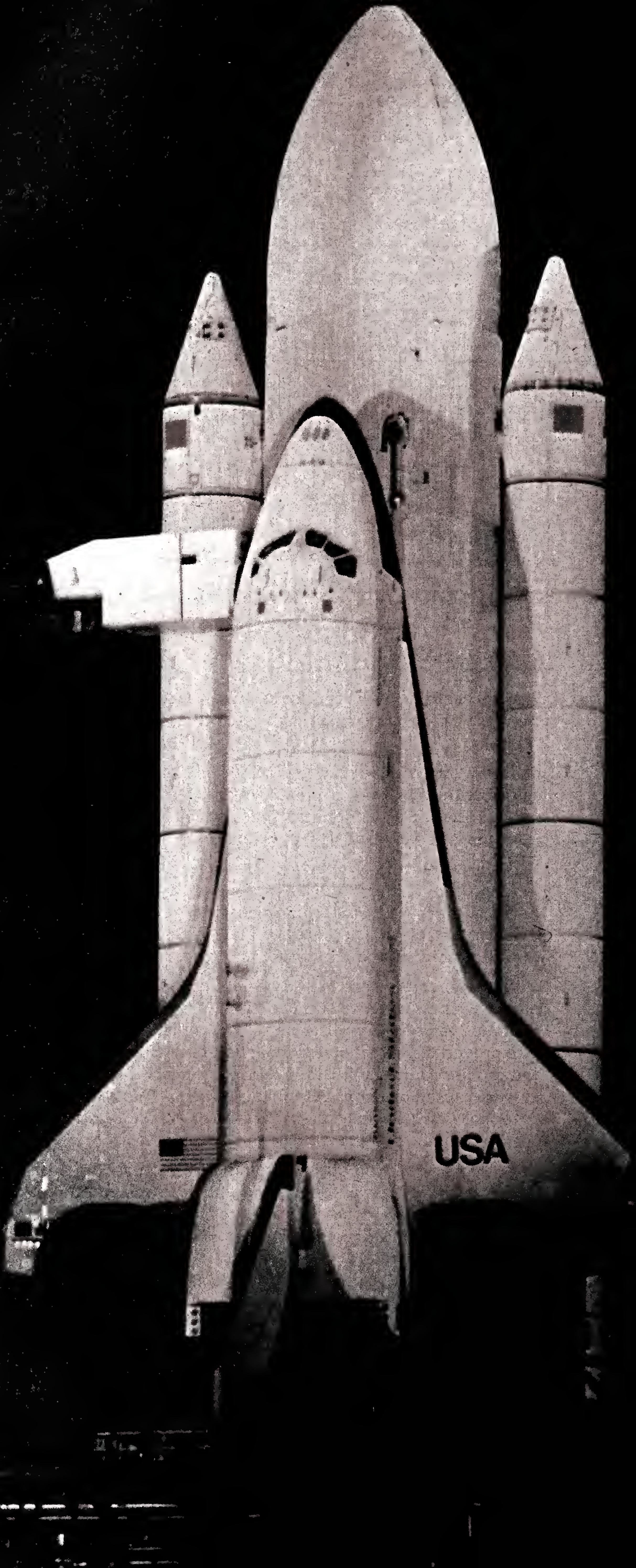
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# When Columbia left the pad, we'd already been tracking it for three days.

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The same no-fail capability that is making the space shuttle program a success is also yielding better than expected results at Jet Propulsion Laboratory in Pasadena, where 140 MODCOMP real-time computer systems in the Deep Space Network are helping to keep Voyagers I and II on course and process the vital data they send back from their interplanetary odyssey.

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# Excalibur Finished Goods Systems Run in RPG-II on IBM System/34

BROOKLYN, N.Y. — Excalibur Data Systems, Inc. has announced a Finished Goods Inventory/Production Requirements system (FGR-528) that can interface with any order-entry/invoicing system that maintains an open order file. The system is written in RPG-II and runs on the IBM System/34.

The FGR-528 is an on-line real-time system. It is able to project finished goods requirements for three weeks, on a week-by-week basis and an "over three weeks" consolidation, taking into account any inventory on hand, the vendor said.

It adjusts for any orders that are on a "hold" status, applying any available inventory first against "ok to ship" or released orders, and then determines finished goods needed to fill orders that are on hold. The display screens show the nonhold and hold requirements separately, the vendor said.

The FGR-528 system automatically updates the finished goods requirements and other data maintained in the system for new orders, shipments (complete or partial), order cancellations (complete or partial) and production, each time any of these activities are processed in the company's overall data processing system.

For firms that do not have a production reporting system, Excalibur also is offering a Production Reporting (PRX-005) system.

The FGR-528 sells for $5,400 and the PRX-005 package sells for $1,800 from the vendor at 26 Court St., Brooklyn, New York 11242.

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## *Minitab Adds CPUs*

UNIVERSITY PARK, Pa. — The developers of the Minitab interactive statistical computing system have added six computers to their list of fully supported conversions.

Pennsylvania State University's Minitab Project now lists IBM, Control Data Corp., Sperry Univac, ICL, Inc. mainframes, Harris Corp. superminicomputers and Terak Corp. microcomputers as supported hosts.

Annual license fees range from $1,000 to $1,500, with discounts available from Minitab Project, 215 Pond Laboratory, Department of Statistics, University Park, Pa. 16802.

## 'Yankeenet' Unveiled

CAMBRIDGE, Mass. — The Yankee Group has announced a service that will allow its clients on-line access to research information within its CPU.

Called Yankeenet, the communications network will consist of the Yankee Electronic Newsletter, transmitted via electronic mail; Voice Store and Forward, an electronic mailbox; Videoteleconsulting, a video taped consulting service; and the Executive Sixty Minutes Summary, highlights of Yankee Group seminars.

Availability of the newsletter and voice bulletin are scheduled for the first quarter of 1982, Videoteleconsulting for the second quarter and the executive summary for late '82, the company said. Yankeenet will cost $11,500 to clients from the Yankee Group, Harvard Square, P.O. Box 43, Cambridge, Mass. 02138.

## *Honeywell DPS 6 Users Gain Security Module*

PHOENIX — Independent Computer Systems (ICS) here has announced the availability of a software security module for the Honeywell, Inc. Level 6/DPS 6 minicomputer line.

The ICS Listener Security Module reportedly provides security by requiring users to be registered and assigning them a password. Two ancillary programs, list users and register users, are provided for listing and registering users, respectively.

The Listener package reportedly traps the spawn group monitor call for the user who is logging in. At this point, the user registration file is checked and the password for that user is compared against the user's input in response to the "Password" query. If the user who is logging in is not registered or uses an invalid password, Listener will report the error, disconnect the user and reconnect to the terminal he is using.

The ICS Listener Security Module requires Honeywell's Gcos Mod400 operating environment, the vendor said. It is available as part of the ICS Toolbox, a set of 120 utilities priced at $7,500. The vendor is located at Suite 106, 8686 N. Central, Phoenix, Ariz. 85020.

## Reporting Capabilities For 'Procxref' Extended

SANTA CLARA, Calif. — Software Assistance here announced that additional cross-reference reports for JCL statements have been added to Procxref, its report utility that was designed to list, summarize and cross reference IBM DOS and DOS/VSE JCL, catalogued procedures and source statement library members.

Procxref reportedly can retrieve procedures directly from system libraries or receive input from other sources via an exit routine. Full expansion of nested procedures and fixed block architecture device support also has been included, the vendor said, and a new reference card summarizes all usages.

The software is said to produce a detail listing of all selected procedures or input jobstreams and a number of cross-reference reports for the different types of JCL statements contained therein. The newly added reports are designed to provide cross-reference of EXTENT information and imbedded procedure usage. Each report is user selectable.

Procxref is distributed on magnetic tape and is available upon request for a 30 day free trial for $1,200. The vendor can be reached through P.O. Box 2101, Santa Clara, Calif. 95051.

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## *Using World's Largest Decnet*

# Tile Siding Helped 'Columbia' Keep Cool

MOUNTAIN VIEW, Calif. — What kept the space shuttle *Columbia* intact during its return through the earth's atmosphere were the tiles on the shuttle's outer surface, which protected the inside from the scorching heat of friction. This crucial tile system was tested in the wind tunnels of the Ames Research Center near here, with the help of one of the world's largest Decnets.

Ames, a research center of the National Aeronautics and Space Administration (Nasa), employs a 34-node Digital Equipment Corp. Decnet. Wind tunnel data acquisition, systems resource sharing and remote job entry (RJE) are the major applications. The network consists basically of PDP-11s, VAX-11/780s and a VAX-11/750.

Since all the systems are linked, software and support can be shared, which saves a significant amount of time and money, according to Jim Hart, chief of the systems development branch. "If the central support group enhances an editor or develops a new graphics display package, installing the utilities becomes almost trivial," he explained. Program development time is reduced because programmers can access from other nodes programs related to their own applications, or they can use the network to see the programs available on other nodes and copy the subroutines that are applicable to their own jobs.

The Ames network utilizes Decnet Phase III, the newest version of the system's communications software. Features that have proven particularly useful, Hart said, are Phase III's "full-routing" and "adaptive-routing" capabilities and the system's network command terminal.

Full routing eliminates the need for physical connections between every pair of communicating nodes, thus reducing the costs of interface hardware. When there is no physical connection between terminals that have to communicate, a logical connection is used instead, Hart explained.

"Usually the terminal is connected to a local PDP-11/34. When the user wishes to develop or execute a program that needs the resources of a larger, more powerful computer, the network command terminal feature sets up a logical link with a remote VAX and allows the user, through his terminal, to make use of the VAX's resources."

Adaptive routing assures that if one link in the network goes down, data will be rerouted over another path automatically. Another means of keeping the system up and operating is a set of network management utilities; they enable the manager of the Decnet system to monitor activity on all Decnet nodes from any terminal.

### Major Applications

Here is a brief description of the three major applications of the Ames Decnet:

The RJE network is used for data acquisition and process control. Nasa Ames is fast adopting DEC's PDP-11/34s and 11/44s as standard data acquisition systems. They collect data and act as concentrators for individual intelligent terminals located in user offices.

The collected data is then transferred via Decnet to a PDP-11/70 at the center of the RJE network. The PDP-11/70 translates and buffers the data. It also acts as the "gateway" system to a large Control Data Corp. Cyber 7600 system. Emulating the station function of a CDC Cyber 172 by means of an emulator specially developed at the Ames Research Center, PDP-11/70 transfers data to the Cyber 7600.

The central node of Ames' second network, the "share program," consists of four VAX-11/780 systems that also communicate with the Cyber 7600.

Each VAX system is conceptually divided into 10 sharable parts. A user group can purchase one or more shares. That portion of the computer's resources is then dedicated to the users within that group. They communicate with the VAX remotely via Decnet at speeds of up to 96K bit/sec.

The share program network supports Cobol administrative-type tasks, computer-aided design and manufacturing, third-package software and also performs extensive number-crunching operations.

The wind tunnel network, as mentioned earlier, is essentially a real-time data acquisition system. Each wind tunnel has up to five DEC processors.

Aircraft design engineers use real-time data to control on a dynamic the variables that affect a model in the wind tunnel. All wind tunnel computer systems are interlinked, so data from experiments in one tunnel can be used in the others. Each processor can also communicate through the gateway PDP-11/70 to the Cyber 7600 number cruncher.

The PDP-11/70 is now being replaced by a VAX-11/780. This new gateway will communicate with the Cyber 7600 and with a Cray 1S system. Ames also plans to add a satellite link that will interconnect its Decnet with the systems at Nasa's Lewis and Langley research centers. It will then be possible for resources at any of the three facilities to be shared by all of them.

# 4540 Local Connect System Operates With IBM-Compatible Controllers

SKOKIE, Ill. — Teletype Corp. has announced a local-connect terminal-cluster control unit for its Model 4540 remote clustered and single-display system that can be connected to a series of host processors via a byte multiplexer, selector or block multiplex channel.

The 4540 Local Connect system operates with processors supporting IBM 3272-2-, 3274-1B- or 3274-21B-compatible controllers and can support up to 32 devices, eight of which can be printers. CRT displays can be located up to one mile from the controller and printers as far as 2,000 feet using two-pair twisted cable.

By using an optional coaxial adapter, stations can also be located up to 2,000 feet away on the user's existing coaxial cable.

Features include a 25th status line on the display that not only provides indications of link continuity and terminal status, but includes a standard row and column counter. The system also includes 24 program function keys on both its numeric pad and standard typewriter-style keyboards, a spokesman said. It has a cursor-select operation, IBM-compatible character insert and erase-to-end-of-field modes.

A typical cluster with six displays and a high-speed matrix printer costs $27,700. A cluster with 14 displays and two printers sells for about $50,700. Deliveries are scheduled for May 1982 from Teletype at 5555 Touhy Ave., Skokie, Ill. 60077.

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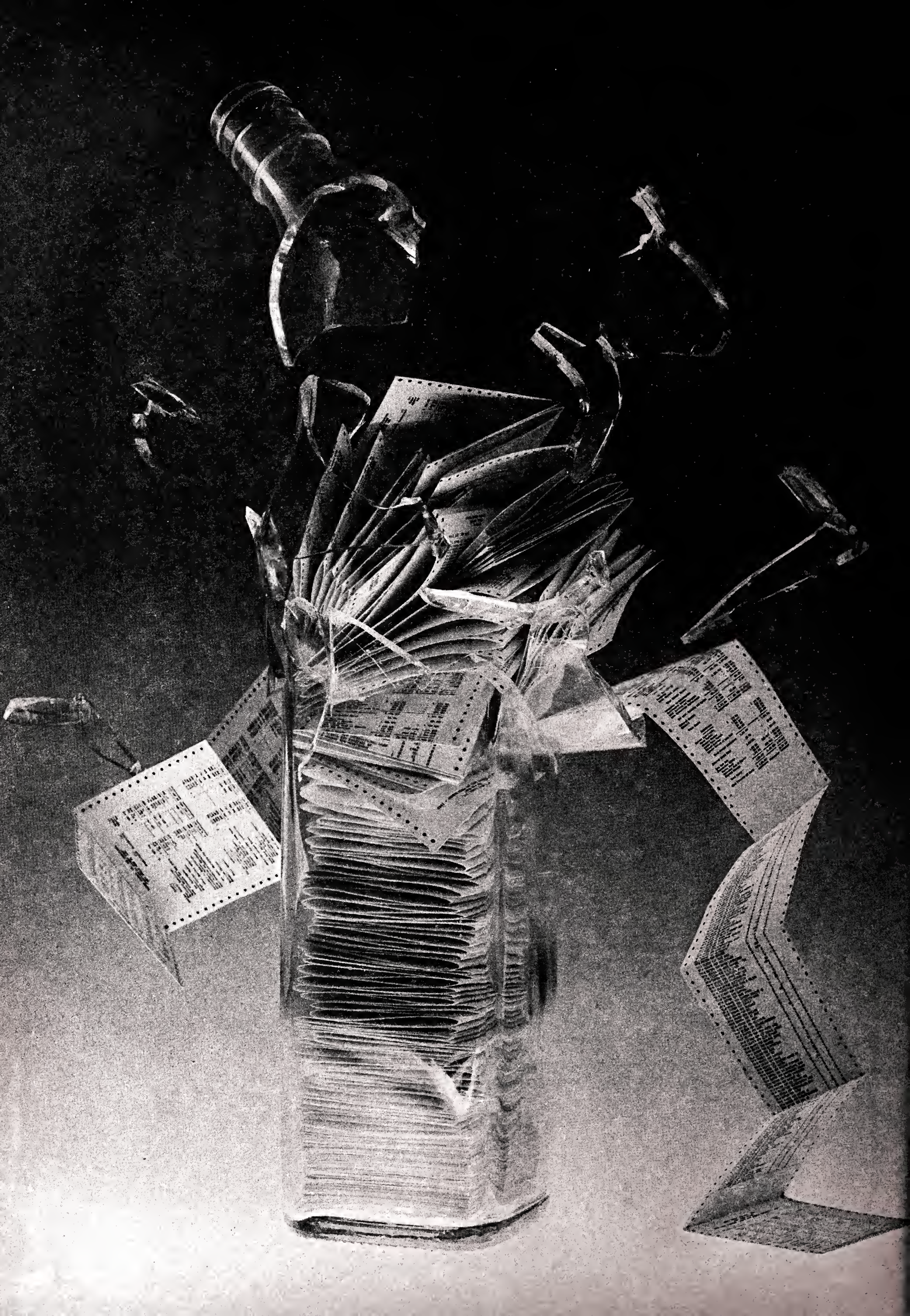

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# Data Switch Cuts PBX Line Costs

MANSFIELD, Mass. — Codex Corp., a subsidiary of Motorola, Inc., has expanded its 7000 Series of electronic data switches by adding a model that is said to handle more traffic than standard voice PBX at less than half the line cost.

The IMS 7800 Data PABX switch allows users to swap between different host computer systems or access different applications on the same host. In addition, it allows users to be automatically queued and then connected to available computer ports.

The microprocessor-based model 7800 data switch is specifically designed for data traffic management and can support up to 254 terminals. All primary routing designations for the terminals are configured via a human-engineered control terminal. Terminal users can then request, through their CRTs, which host or application they want to access, a spokeswoman stated. The switch handles both synchronous and asynchronous traffic.

Status reports on the configurations, as well as on current activity, can be obtained through the control terminal, the spokeswoman noted.

The 7800 switch provides a number of network control features, including alarm reports generated on the control terminal in the event of equipment malfunction. Switchover occurs automatically — an automatic redundancy — if the problem resides in mainframe logic. Hard-copy printouts of the problems can be obtained via a printer used in conjunction with the control terminal.

Codex's network control switch — the IMS 7700 — was introduced in 1980 and allows users to electronically reconnect all terminals from the primary front end to a back-up front end. The alternate configuration is defined in off-line memory and then loaded on-line via the system's control terminal, the spokeswoman continued. Like the IMS 7800, the 7700 provides status and diagnostic information on the performance of the total system.

Prices for the IMS 7800 switches start at $42,000, while the cost of the 7700 Series ranges from $37,000 to $78,000. Codex is at 20 Cabot Blvd., Mansfield, Mass. 02048.

# *Smart Modem Uses Intel Micro*

MARKHAM, Ont. — Interplanetary Computer Systems Ltd. has unveiled an intelligent direct-connect auto-answer and originate repertory-dialer asynchronous modem.

The menu-driven PDS103A uses an Intel 8049 microcomputer with 2K bytes of read-only memory, which allows a terminal user to dial up a computer with two keystrokes, the vendor said. A user can select from 18 user-programmable, 14-digit numbers by typing a single letter. The modem automatically senses the terminal's baud rate, from 110 to 300 baud, and then dials the computer. A user can change phone numbers or select half- or full-duplex, dialing pulse rate, parity and cancel (log-off) code.

The PDS103A plugs into any RS-232C port and is available in end-user and OEM configurations, a spokesman said. Manufactured by Pure Data Ltd., a Canadian research and development firm, the PDS103A end-user version costs $379 and will be available Feb. 1.

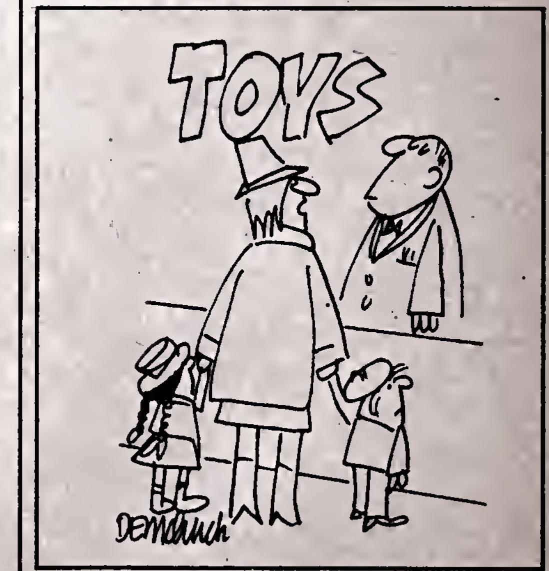
More information is available from Interplanetary Computer Systems, 950 Denison St., Unit 17, Markham, Ont. L3R 3K5, Canada.

# Gnet Allows Tie-In to Prime

LA JOLLA, Calif. — A communications facility that connects Prime Computers, Inc. computers to any other remote, interactive system is being offered by Primarily Software, Inc.

Called Gnet, the asynchronous communications facility performs a variety of systems change-over, data acquisition and networking problems, according to the vendor. Gnet supports program/file transfer between the two systems, log-ins to the remote system, use of Prime operating commands on the local system, special capabilities for Prime-to-Prime communications and network configuration — based on the characteristics of the remote system. All communications are through a directly connected asynchronous "terminal" line or a modem/telephone line, the vendor said.

The package, including sources and documentation, costs $1,000 from the firm at 1227 Pearl St., La Jolla, Calif. 92037.



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### *First User Of Burroughs B 6900*

# Center Gives Dual-Processor Top Grades

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RIVERSIDE, Calif. — There are a number of reasons why the Riverside Regional Education Data Center (RREDC), which provides data processing services to 54 school districts and more than 160,000 students here, decided to replace its old uniprocessor computer with a dual-processor system.

For one thing, with an increasing demand for services, the RREDC was virtually "running out of machine," according to Dr. William H. Nuckols, the data center's director. For another, the center wanted to move to a totally on-line environment, but did not have the machine muscle to make the switch.

And although its previous Burroughs Corp. B 6700 computer system — in use since 1975 — was reliable, the center wanted to guarantee uptime — something inherent to a dual-processor system.

### First User

The RREDC replaced the B 6700 with Burroughs' dual-processor B 6900, becoming the first user of the machine. The center decided to stick with the same vendor because of its past experience with the firm and the fact that it would have cost up to $2 million to convert software to a non-Burroughs machine, Nuckols said.

The B 6900 dual-processors have a total of 6M bytes of main memory and share more than 2.6G bytes of disk storage. The system's two 130M-byte removable disk packs and six 402M-byte fixed disk packs can all be reconfigured on-line to meet the center's changing storage requirements, he added.

Using leased lines and county-owned microwave transmitters, the B 6900 computer will be on-line to approximately 120 terminals, including Burroughs TD 830 input and diplay terminals. The system also has two 2,000 line/min printers and five 6,250 bit/in. magnetic tape drives, he explained.

"Since we operate as a service bureau in contracting for optional services, responsive software and excellent service to our users is mandatory," Nuckols said, explaining the need for a larger and more reliable system. "The data center must provide cost-effective services to school districts or districts will find alternative sources."

Financial activities handled for the school districts include on-line applications for payroll, personnel, accounts payable, stores inventory, capital assets and budgeting. The system also controls more than 100,000 student files, which include class scheduling, attendance, grade reporting, testing and student histories, Nuckols pointed out.

Like its systems successor, the B 6900 primarily uses Burroughs Data Management System software. Other packages include a report writer, command and edit language, network definition language and a generalized message control system. All of the software is under the control of Burroughs' master control program operating system.

Since all peripherals and data communications lines connected to the B 6900 are switchable, jobs and data can be transferred between systems in a matter of minutes, Nuckols claimed.

Basically, this means that resources can be put where they are needed, peripherals will be better utilized and more work will be accomplished, he said.

Future plans for the system include developing an on-line audio/visual booking application to be used by the school districts and a student vocational guidance system that will shortly be available to the area's secondary schools.

# Swedish Shipping Fleet Navigates Smooth Sailing With In-House System

STOCKHOLM, Sweden — Ten years has meant a lot of changes for Saleninvest (Salen), a shipping firm here. In the past decade, the firm has gone from a single-terminal time-sharing operation to a full-scale in-house system.

Salen operates a fleet of 250 to 300 cargo vessels. It is involved in oil and gas exploration, production and marketing of marine equipment, technical consulting and project management. The firm also distributes automobiles and food items.

The computer services are used to process data associated with Salen's "reefer" fleet — refrigerated vessels transporting perishable goods.

In 1969, Salen installed a single-terminal link with Control Data Corp.'s Cybernet service bureau in Stockholm. It started out with a CDC Mark II terminal and wound up with a total of 713 terminals, according to Lars Lonnberg, the firm's DP manager.

By 1977, the firm had switched from Cybernet to an in-house system based on a Cyber 18. While that system offered standalone capabilities, the firm used it to handle key-to-disk data entry for the Cybernet processors, Lonnberg said.

Last December, Salen took another step up the CDC product ladder when it installed a Cyber 720 computer to process its business applications. The Cobol-based system uses 700 programs developed in-house and about 100 others it acquired from outside vendors, Lonnberg continued.

CDC developed a specialized operating system for the firm back in 1973 for use on the Cybernet system. When Salen installed the 720, CDC upgraded the operating system, the DP manager said.

The processor routes 50 ships moving through foreign ports and keeps track of cargo, personnel and maintenance on the vessels. The internal network of terminals allows workers at the Stockholm base to input and retrieve information ranging from the price of fuel oil to the availability of crews. All major operations of the reefer fleet, including administration, finance, accounting, personnel (office and ships), technical data, ship maintenance, marketing, legal, payroll and shipping routes are handled by the Cyber 720, Lonnberg said.

Salen assigns 10 ships to one supervisor. This individual staff handles all tasks associated with planning a ship's voyage, according to Lonnberg.

# Graphics Aids Bow For Accounting, Manufacturing Printing Applications

ATLANTA — Graphics aids for manufacturing and accounting printing applications have been announced by Technical Analysis Corp.

Option-programmable read-only memory chips that use random-access memory, the Macropix and Macroform products are said to offer invoice and purchase-order generation; inventory, shelf and bin labeling and custom shipping label generation.

Macropix stores digitized pictures for forwarding to the Micrografix unit memory. Macroform adds store-and-forward capabilities to the line-drawing character set concept, according to the vendor.

Priced at $200 each, the features are available in 30 days on a factory-installed basis only. The firm is located at 120 W. Wieuca Road N.E., Atlanta, Ga. 30042.

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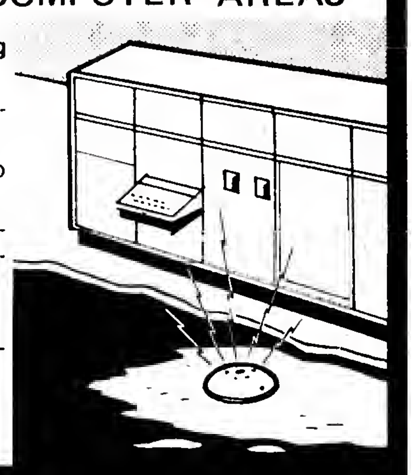

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## *Alert Systems Protect DP Sites*

SAN JOSE, Calif. — Innovations in Control, Inc. has announced two computer room alert systems — the DPU 180 and the DPU 100.

The DPU 180 features continuous digital display of the computer room's temperature and features a temperature prealarm and interrupt thresholds that are site-selectable via thumbwheel switches. The system costs $695, the vendor said.

The DPU 100 is a scaled-down version of the DPU 180. It does not include digital display of the room temperature. It costs $525, the vendor said.

The firm is located at Suite 24, 409 Reynolds Circle, San Jose, Calif. 95112.

## Drum Plotter Introduced

AUSTIN, Texas — The Houston Instruments Division of Bausch & Lomb Corp. has announced an 11-in. drum plotter that is available with industry-standard interfaces and five configurations.

The Complot CPS-20 is a single-pen unit that features touch-type controls and can be used in almost any environment. The plotter can be attached to varying processors by switching an interface board. Operation is 3 in./sec at a resolution of .005 with plots as long as 144 ft, the vendor said.

Units cost from $3,995, the vendor said from One Houston Square, Austin, Texas 78753.

## Controller Aids Pragma Systems

SUNNYVALE, Calif. — Pragma Data Systems, Inc. has announced a controller to support a mix of the firm's DAC 2080 Direct Access Cartridge System and Priam disk drives.

The Model 1201 controller features data transfer rates up to 2M byte/sec, a 2M-byte buffer and logical sector addressing. Data transfers may be I/O or DMA-driven, according to the vendor.

Sector sizes are selectable at 128-, 256-, 512- and 1M byte for disk products and 512- and 1M byte for DAC 2080 drives. Prices start at $1,495 in quantities of one to nine from 610 Palomar Ave., Sunnyvale, Calif. 94086.

## Interface Offers Bar Code Reader

LYNNWOOD, Wash. — Interface Mechanisms, Inc. has announced the Model S35, a bar code printer that prints bar codes and human-readable information on a single label.

The unit uses Code 39, an alphanumeric bar code set that can accommodate a 9.4 char./in. format. The user can order the Model S35 with either five or 10 lines of human-readable text capability.

The unit uses roll-fed labels or tags and a label-dispensing option, which removes the backing from the label immediately after printing, according to the vendor.

The S35 costs $8,995. The vendor can be reached through P.O. Box N, Lynnwood, Wash. 98036.

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| Smooth Scroll, Slow Scroll and Jump Scroll | STD | NO |
| Audible Key Click | STD | STD |
| Non Volatile Set-up Modes, "Menu" Style | STD | NO |
| 25 Status Line | STD | STD |
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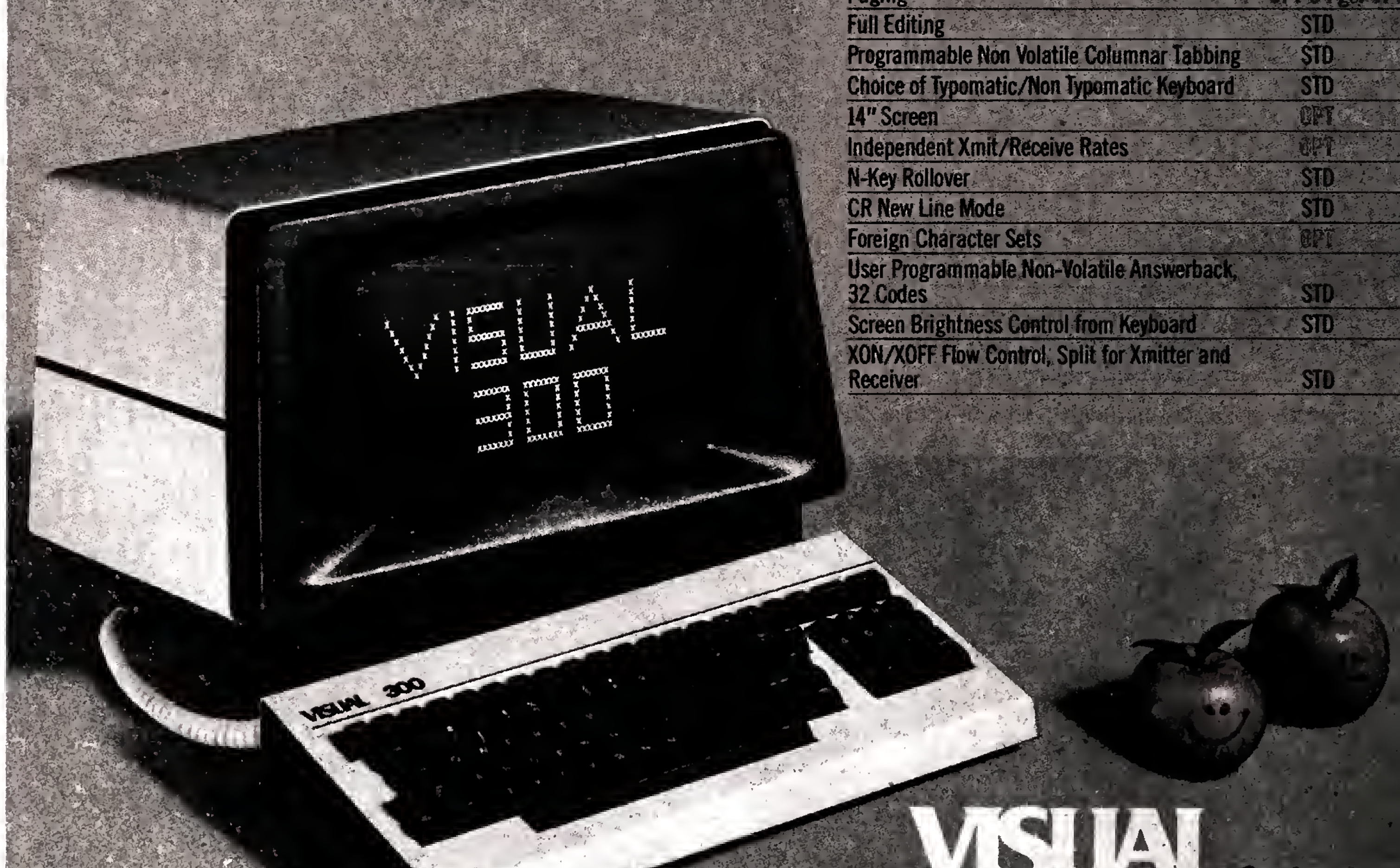

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# Mini Bits

### S1410 Controller Designed For Seagate Compatible Drives

SUNNYVALE, Calif. — Xebec Systems, Inc., a Microcomputer Systems Corp. company, has introduced a controller designed specifically for Seagate 5¼-in. compatible drives.

The S1410 is compatible with Shugart Associates, Inc.'s SA 1400 series host interface, which allows it to operate with all popular host adaptors. The S1410 combines a microprocessor-based controller with on-board data separator logic and Shugart Associates SA 1400 series host interface. It is capable of controlling two drives simultaneously, the firm said.

The unit is priced at $295 from Xebec at 432 Lakeside Drive, Sunnyvale, Calif. 94086.

### S-100 System Available On Single S-100 Board

GARDEN GROVE, Calif. — An S-100 computer system on a single S-100 board has been introduced by Advanced Micro Digital Corp.

Super/Net consists of 64K bytes of random-access memory, Intel Corp. Z80A CPU, 2,716 bytes of monitor erasable programmable read-only memory, 5¼-in. and 8-in. floppy disk controller and two serial and two parallel interface ports. Super/Net reportedly meets IEEE-696 specifications and operates under both CP/M and MP/M software from Digital Research, Inc.

Super/Net costs $1,125 with volume discounts available from the firm at Suite E, 7201 Garden Grove Blvd., Garden Grove, Calif. 92641.

### Memory Module Fits DEC Processors

WESTLAKE VILLAGE, Calif. — Chrislin Industries, Inc. has announced the CI-1123, a memory module for Digital Equipment Corp. LSI-11/23 and PDP-11/32 processors.

The 128K-byte board fits into a single slot and features an access time of 240 nsec and a cycle time of 400 nsec. It is addressable as a contiguous block in 4K-byte word increments through 4M bytes, the vendor said.

The boards cost $1,795, the vendor said from 31352 Via Colinas, No. 102, Westlake Village, Calif. 91362.

### Card Punch Designed For DG Nova Processors

FRAZER, Pa. — Cardmation Co. has announced the PC200/51, a card punch for Data General Corp. Nova processors.

The unit can process between 100 and 250 card/min based on the location of the last column punched. It has a capacity of 100 cards and uses the same control software as DG's tape handling unit, the vendor said.

The PC200/51 costs $12,500 and leases for $357/mo on a five-year agreement. Cardmation can be reached through P.O. Box 746, Frazer, Pa. 19355.

### Desktop Diskette Copiers Operate Via RS-232 Interface

IRVINE, Calif. — Media Systems Technology, Inc. has announced two desktop diskette copiers.

The 5208 and 5248 units can duplicate and verify single-sided and double-sided 5¼-in., 48TPI diskettes in an operator-selectable quantity ranging from one to 999 copies. The unit is compatible with personal and small business systems via an RS-232 serial interface, the vendor said.

The 5208 costs about $10,000 and the 5248 costs about $13,000, the firm said from 17991 Fitch Ave., Irvine, Calif. 92714.

# Mini Helps Nasa Laboratory Ease Paperwork Burden

PASADENA, Calif. — The road to outer space is paved with paperwork.

The National Aeronautics and Space Administration's (Nasa) Jet Propulsion Laboratory (JPL) here is not a newcomer to using computers. JPL's Deep Space Network (DSN) is one of the keystones of the U.S. space program, transmitting vital instructions to spacecraft like the Mariner, Viking and Voyager projects and supplying scientists with reams of data from heretofore uncharted frontiers.

But JPL had a problem. Until about a year ago, the agency was using a word processing service to prepare documentation for the network. The service was connected to the DSN processors via telephone linkups and the hard copy had to be delivered to JPL by couriers. The whole process took about 24 hours and according to operations supervisor Pat Shepard: "Line transmission was occasionally erratic. If you received garbled data, you were forced to hang up and start all over.

"Frankly, these stumbling blocks affected our efficiency and morale," she added.

Reed Miner, manager at the Software Production Management and Control (SPMC) Laboratory, the department responsible for producing technical documents, operator manuals and other specifications for DSN and other projects, said the turnaround time for documentation was inadequate. In addition, the word processing service was becoming too expensive and could not handle the growing library of SPMC publications.

The users of the documentation, tracking station personnel in places like the California desert, Spain and Australia, are usually unable to call the author and ask for clarification. In addition, nearly 50 engineers and programmers are constantly developing and enhancing DSN programs. Therefore, Miner pointed out, the network is constantly changing and those involved with it must be working with the same set of information.

"In the fall of 1978, we formed a study team to evaluate our word processing needs and generate a set of technical requirements. In early 1979, we solicited, received and evaluated proposals," Miner said.

That May, SPMC decided to acquire an AM Jacquard Systems, Inc. minicomputer, which was leased through Professional Computer Marketing, a Los Angeles sales contractor.

#### Installations Abound

SPMC installed two J100 shared-logic processors with 48M bytes of mass storage. Each processor has four J105 satellite workstations. In addition, two J500 standalone processors and five printers, including two high-speed line printers, were also installed, Miner said.

"We have a larger customer base and put out more pages than we did last year. If we had to produce this rate on our previous system, our monthly bills would have been twice as high. Moreover, we would not have been able to offer as many services," according to Miner.

Revisions make up a large portion of SPMC's work load. With the AM Jacquard system, Shepard said, technicians can make faster updates to existing manuals and decide when the amount of changes that have to be made warrant reissuing the manual.

SPMC technicians work with the same six to eight engineer/programmers and become very familiar with their specific requirements. Technicians are each assigned a segment of mass storage, which they catalog daily for record-keeping purposes, Miner said.

Although available storage can accommodate larger manuals, the technicians divide each manual into files of 50 to 100 pages, which are named sequentially. Each page contains a footer with the file name. When an author brings in revised pages, the footer information tells the technician exactly where to locate those pages. Upon completion of the manual, the files are strung together to form a completed document.

# Winchester Disks Fit Xycom's Systems

SALINE, Mich. — Xycom, Inc. has introduced two Winchester-technology hard disks that can be used with the firm's development systems or computer systems using an RS-422A serial interface.

The 10M- and 20M-byte disk drives are fully supported by Xycom's software, including the Industrial Software Systems, which consist of industrial Pascal, CP/M and several other languages and Xycom's Ladder Diagram Translator.

The software drivers of both packages partition the hard-disk drive into eight I/O devices, a spokesman said. The first seven are 2,048 blocks long, which is 4.5 times as large as floppy-disk storage. The remaining unit contains the remainder of the disk's block: 4,780 blocks on the 10M-byte unit and 19,864 blocks on the 20M-byte device.

The disks support the synchronous data link control bit synchronous communications protocol.

Additional features include automatic head locking, 500K bit/sec internal clock rates or up to 800K bit/sec external clock rates, error recovery and logging capabilities and read buffering.

The disks are available as tabletop or rack-mountable versions and cost $7,950 for the 10M-byte model and about $8,850 for the 20M-byte drive.

Xycom is located at 750 N. Maple Road, Saline, Mich. 48176.

# Controller Merges TI to IBM Printer

LOS ANGELES, Calif. — Spur Products Corp. has introduced a controller that enables a Texas Instruments, Inc. computer to operate in conjunction with an IBM 1403-N1 impact line printer.

The Spur S1403/TI controller is a plug-compatible replacement for the Dataproducts Corp. printer that is standard for TI computers, the vendor stated. The Spur controller performs all the logic, memory, power, signal conditioning and control functions of the printer.

The 1403-N1 prints at 1,100 line/min and offers interchangeable type trains. The cost for a converted 1403-N1 printer is $12,000, when purchased from Spur. The controller costs $20,125 and includes all logic cards, memories, operating instructions, start-up and operator training, according to the vendor.

The firm is located at 1904 Centinela Ave., Los Angeles, Calif. 90025.

## *Epic Adds Winchester Disks To Episode Business System*

SAN DIEGO, Calif. — Epic Computer Corp. has added three Winchester-technology hard disks, with storage capacities ranging from 2.5M- to 10.6M bytes, to its Episode microcomputer-based business system.

The hard disks replace one of the two floppy disks usually included with the computer system. One double-sided floppy remains as a backup, providing up to 800K bytes of additional storage, a spokesman said.

The computer has 64K bytes of random-access memory, with all of its logic contained on a single printed circuit board. The system does not include any CRT terminals or printers, but is said to be able to interface with most peripherals. The computer's software includes Digital Research, Inc.'s CP/M operating system with complete diagnostics and the firm's Supervyz translation software package. The latter software requests information from the user in plain English and translates it into a CP/M-recognizable form, the spokesman added.

The hard disk versions of the Episode system are priced at less than $6,500 and will be available in early 1982 from the firm at 7542 Trade St., San Diego, Calif. 92121.

## ALS Offers Smart Interface Card For Apple II, Apple II Plus Users

SUNNYVALE, Calif. — ALS, Inc. has introduced its Smarterm intelligent 80-column interface card for users of Apple Computer, Inc. Apple II and Apple II Plus systems. The card reportedly offers:

- Double the standard Apple II line width in text mode.
- Full upper and lower character set.
- A new medium-resolution graphics mode.
- Full support of Basic, Pascal and CP/M.
- Full Ascii character set not normally available on the Apple keyboard.

The Smarterm peripheral card plugs directly into one of the expansion slots for the Apple systems. Standard video output of the Apple and the interface cable for the video monitor are both connected to the card, permitting use of both video sources simultaneously with two monitors.

When used with Basic, Smarterm supports all tab commands and provides a debug mode that displays control characters, the vendor said.

Smarterm is priced at $379, its vendors said from 1195 E. Arques Ave., Sunnyvale, Calif. 94086.

## HP Users Get Med-Art 250

PALO ALTO, Calif. — DCA Health Systems, Inc. has announced Med-Art 250, a medical record system that incorporates a Hewlett-Packard Co. HP 250 small business processor.

Features include a data base management system, a distributed processing architecture and compatibility with HP's line of personal computers. The system is based on a 16-bit processor and features 16M bytes of storage in a Winchester-type disk drive.

An extra 19.6M bytes of storage is available by adding an HP 7906 disk drive. Systems cost about $50,000, the firm said from 2525 E. Bayshore Road, Palo Alto, Calif. 94303.

## Printing System Fits System/34, -38 CPUs

MENLO PARK, Calif. — BDS Corp. has announced a plug-compatible printing system for IBM System/34 and System/38 processors.

The printing system consists of the firm's BDS LQ40 printer and Model IPI-34 interface. The LQ40 is a bidirectional printer with 132 column spacing at 10 char./in. Character spacing is switch-selectable and the maximum forms width is 16 in., the vendor said.

The printing system costs $4,695, the vendor said from 115 Independence Drive, Menlo Park, Calif. 94025.

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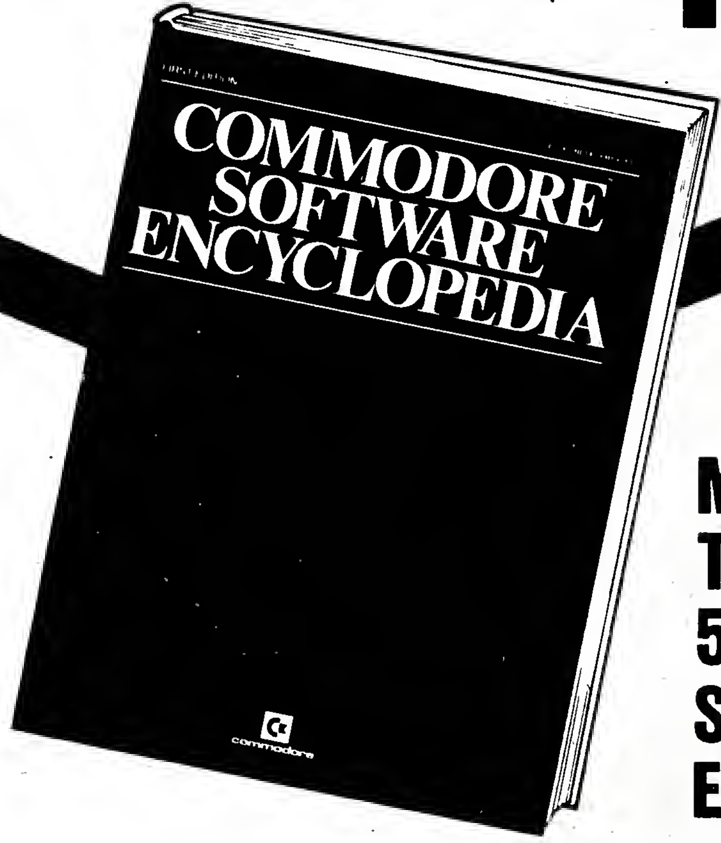

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### *Frees Attorneys for Cases*

# Law Firm Gets Charge Out of O/A System

DENVER — Better organization, increased efficiency and less typing are the hallmarks of office operation at Whittington & Gengler here since the law firm installed an administrative system.

Fourteen terminals of an IBM 5520 Administrative System dot the busy offices of the nine-attorney firm, which handles a heavy load of energy-related legal work. "Our biggest need was a cost-effective way to provide everybody with a word processing machine," Office Manager Barbara J. Sullivan said.

Whittington & Gengler is using the 5520 system to save time and effort, as well as freeing its attorneys for the most complex, novel and demanding cases — cases that are frequent in the oil and gas and mining fields.

### 'Farm-Out Library'

The firm is developing a computerized "farm-out library" to ease the preparation of the "farm-out agreements" — the often complex agreements that govern oil and gas drilling. A similar effort involves mining joint-venture agreements.

"The system allows people to be better organized," attorney Thomas W. Whittington, a principal in the firm, said. "Retrieval is faster. It's more efficient in terms of effort and time expended. We can do a farm-out agreement faster and have a better quality product."

Whittington & Gengler is developing the farm-out library on the 5520. With the key material organized and stored in the computer, secretaries and legal assistants can call it up on the screen for editing or more writing. That saves countless rounds of typing and retyping.

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**Legal aides using the IBM 5520 Administrative System at the Whittington & Gengler law firm in Denver**

The firm is also using the concept for such things as wills, articles of incorporation and title opinions.

Much of the language of any legal document is fairly standardized. Of course, there are long passages and unique paragraphs that make each completed document different. Whittington & Gengler has stored forms and such unique paragraphs in its 5520. When someone wants a document prepared, a legal assistant with a detailed checklist can prepare the initial draft.

"The checklist is so complete, the legal assistant won't leave out anything," Sullivan said. They then take the checklist, search through the computer library and find the appropriate forms and paragraphs.

They put the document together and then give it to the attorney who checks to see if it is proper and does not omit any unique features.

### Reduces Repetition

"It saves the repetitive task of retyping each paragraph as well as the attorney's having to rethink each one. That's time and effort saved for both the attorneys and the support personnel," Sullivan added.

"Our legal assistants or paralegals should be allowed to develop their own initial drafts of documents and reports. Our attorneys, of course, check them closely," Whittington said.

"That frees the attorneys to deal with the more unique and complicated problems," he added.

"If they couldn't retrieve the forms, they would have to type a document from scratch each time. With a five-page document, perhaps four-fifths of it already could be prepared and in the computer," Whittington said.

"With the shared logic, we can have 14 people preparing farm-out agreements at the same time from the same computerized library," Sullivan said.

One of the firm's major clients also has expressed an interest in utilizing the 5520 system's document distribution features to cut down on courier time and costs.

All that saves time and energy. And energy is Whittington & Gengler's main business these days.

# Comet Offers Forms Facilities, Expanded Editor

CAMBRIDGE, Mass. — Computer Corp. of America announced here that its Comet Electronic Mail System now offers forms facilities and an expanded text editor. The Comet system runs on IBM and plug-compatible mainframes, as well as on Digital Equipment Corp. PDP-11 systems.

Users reportedly can create a form template on a Comet terminal and store this form in an electronic file. When needed, the form can be retrieved, completed with the necessary data at the terminal and then sent to the appropriate person's electronic mailbox for his action or files.

New features of Comet's text editor are said to simplify the process of composing messages at the terminal. Users reportedly can edit and reuse already existing messages. In addition, new features were designed to enable users to rearrange the sequence of words, sentences and paragraphs within existing texts.

### Person-to-Person System

Comet, described as a computerized person-to-person communications system, is designed to be used by managers and professionals from terminals at their desks. It is capable of message preparation, filing, retrieval and distribution control, according to the vendor.

Users can license Comet software for use on their in-house system, or can connect to Computer Corp. of America's Comet service on a monthly subscription plan, the vendor said.

The Comet enhancements are standard features included on both IBM and DEC versions of Comet, at no additional charge to current users. Licenses for the DEC version of Comet are available for $40,000. The IBM version can be licensed for $60,000. The monthly subscription rate per mailbox is $60, and per company it is $100, the vendor said.

Computer Corp. of America is located at 675 Massachusetts Ave., Cambridge, Mass. 02139.

# Infogate Adds to T/S Access Abilities

SILVER SPRING, Md. — Dialcom announced here the addition of communications software called Infogate that was designed as an interface for its time-sharing service customers to other existing data bases.

A vendor spokesman explained that Dialcom's Infogate service allows users to access any data base now in the Telenet or Tymnet X.25 family. Users must have previously established accounts with the data base suppliers unless Dialcom has made arrangements for access.

The users reportedly can key in search requests to the Dialcom computer via the time-sharing network before connecting with another network. The vendor claimed the user therefore spends less time accessing the data base on the more expensive system.

Dialcom said that since its computer makes a record of all information displayed, the user can peruse the material at its leisure, after he is off the more expensive time-sharing system.

Infogate is available from Dialcom on a time-sharing basis, priced on a time-usage rate, the vendor said.

Dialcom is located at Suite 410, 1109 Spring St., Silver Spring, Md. 20910.

# Printer Sharing Software Enhanced

PALO ALTO, Calif. — Nestar Systems, Inc. has unveiled Version 2.0 of its Network Print Server software product, which allows users of the vendor's Cluster/One Model A local-area network to realize centralized printer sharing.

The firm has also enhanced its Clusternet local-area network to include Apple Corp. Apple III computers in addition to Apple IIs.

Version 2.0 adds support for multiple printers, multiple networks or multiple OS. From their workstations, individual users may request printing of electronic mail messages, programs or data files on any of up to six printers attached to one or more Network Print Servers, the vendor said.

The Network Print Server license fee is $995.

Apple II computers, including those with Apple's new 5M-byte Profile Winchester-technology hard disk, can now be freely intermixed with Apple IIs as workstations up to the network limit of 65 stations on Nestar's Cluster/One Model A distributed computing and communications system. Apple IIs will continue to be used as file, print and communications servers.

Nestar is located at 2585 E. Bayshore Road, Palo Alto, Calif. 94303.

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The Exposition hours are from 10 a.m. to 4 p.m. on Tuesday, January 12th and Wednesday, January 13th and from 10 a.m. to 3 p.m. on Thursday, January 14th. Admission to the Exposition is free, and if you present a copy of this ad at the registration desk, it will be your ticket for one free drink in the Exposition hall.

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**Tuesday to Friday, January 12-15:** This four-day program includes sessions on voice/data and telecommunciations *and* includes special sessions Thursday and Friday on electronic mail and office communications (EM/OC) — for which you can sign up separately. Admission includes lunch and beverage in the exhibit hall for each *full* day of sessions and is $445.

**Thursday and Friday, January 14-15:** This is the special program on electronic mail and office communications only (EM/OC) and includes lunch and beverage on Thursday. Admission is $245.

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# *Motorola Plans Acquisition Of Four-Phase in Stock Swap*

**By Marcia Blumenthal**
CW Staff

SCHAUMBERG, Ill. — In a move calculated to expand its presence in the data processing equipment market, Motorola, Inc., a major supplier of semiconductors, has announced plans to acquire Four-Phase Systems, Inc. in a stock swap valued at about $253 million.

If the acquisition is approved by the shareholders of Four-Phase, Motorola stands to gain capability in both interactive distributed processing and IBM-compatible batch-oriented systems.

Four-Phase is known primarily for its distributed processing systems, which some industry observers have considered as alternatives to IBM's 8100. Moreover, about a year ago, Four-Phase acquired Two Pi Corp., a maker of IBM-compatible 370 equipment.

Lee Boysel, chairman and president of Four-Phase, has stated that the ability to place batch-oriented systems in remote computing locations will be the key to success in the distributed processing market [CW, April 13]. Four-Phase is considered to have a strong end-user marketing organization.

Although Motorola currently does not have computer systems capability, it made its first entry into the data communications market in 1977 when it acquired Codex Corp., a modem manufacturer. In 1980, Codex, a Motorola subsidiary with sales of about $140 million, contributed about 4% of the parent company's $3.1 billion in revenues.

Robert W. Galvin, Motorola's chairman and chief executive officer, said "Our perception of the future of the electronics industry and the success of our Codex subsidiary" is propelling the firm's move into the data processing industry.

### Other Semiconductor Firms

However, Motorola is only one of many semiconductor firms to vertically integrate its product line. Texas Instruments Inc., Intel Corp. and National Semiconductor Corp. have already broadened the scope of their semiconductor operations by offering computer systems. In fact, Motorola is somewhat late in making the move into the computer industry, one observer noted.

Under the terms of the proposed acquisition, the exchange rate will range between .634 and .763 of each share of Motorola for each of the outstanding 5.6 million common shares of Four-Phase. The exchange ratio will depend on the average price of Motorola's stock during an unspecified period before Four-Phase shareholders vote on the acquisition. Motorola noted Four-Phase officers have agreed to vote their own shares in the transaction.

In addition, the agreement

*(Continued on Page 56)*

# Japan to Break IBM Mold

**By Robert Batt**
CW West Coast Bureau

TOKYO — Japanese efforts to lead the way in fifth-generation computer technology were boosted with the recent announcement of a plan to finance the development: The powerful Ministry of International Trade and Industry (Miti) wants to spend $46 million over the next three years as part of the country's continuing challenge to IBM.

Earlier this month, Miti released details of a study that concluded Japan's best competitive strategy was to cease imitating IBM technology and to begin building knowledge information processing systems [CW, March 16]. These systems would not be based on Von Neumann architecture, which has dominated computer system design for the past 20 years.

Japan's recognition of the need to break the IBM mold was the major theme of a report published by the Committee for Study and Research on Fifth Generation Computers, formed by the Japan Information Processing Development Center (Jipdec) after an approach from Miti.

The Jipdec study envisioned fifth-generation computers that emphasize specialized rather than general-purpose functions. Specialized processors to be used include high-level language processors, data base machines, memory level control and image processing systems.

Announcing the plan to schedule funds from the national budget, Miti officials said the subsidies, of which $46 million would be just the first installment, were expected to be used by private manufacturers to produce computers capable of making conversation — the ability to store and retrieve data in a manner similar to that of the human brain.

The computers were also expected to contain an information processing function that could include the use of "judgment."

"The functions of the new generation of computers," one Miti official said, "should permit operators without any specialized knowledge to most easily use them and even to program the machines without much training."

Japan's five largest computer makers — Fujitsu Ltd., Hitachi Ltd., Toshiba, Nippon Electric Co. and Mitsubishi Electric — are expected to play key roles in the development program.

# Firms Streamline For Economic Slump

**By Marcia Blumenthal**
CW Staff

MAYNARD, Mass. — Responding to some softness in orders and a need to control inventory, Digital Equipment Corp. has offered its 29 major manufacturing plants the option of closing down for the week between the Christmas and New Year's holidays.

DEC's move is just one of many streamlining maneuvers the industry has seen in recent months.

This is the first time DEC has had such a holiday shutdown. Thus far, employees at 13 plants have agreed to closing plants.

Under the arrangement employees can work overtime prior to the closings to make up the time or can take vacation. It is a popular vacation week anyway, a DEC spokesman said, noting that usually 25% to 30% of the manufacturing work force takes that week off.

DEC has been experiencing some softness in the commercial OEM, medical and education markets, the spokesman said. Moreover, with recent completion of plant expansions the firm can now deliver most products in 60 to 90 days, so backlogs are not as heavy as in prior years, he noted.

Although DEC President and Chief Executive Officer Kenneth H. Olsen has long-warned stockholders of the impact the current economic doldrums could have on the industry, his firm has grown at a pace far exceeding the industry. Now it appears that DEC, like other industry firms, is reacting to the pinched economy.

### Streamlining Actions

While DEC's recent move does not involve layoffs, in recent weeks a spate of layoffs, furloughs or other plans have been announced at many firms in the computer industry. Most firms have said they have taken these streamlining actions because of an increase in the competitive environment of the industry, reduced profit margins, a slowdown in sales or the need to refocus their market direction.

What all this streamlining activity portends for the industry in the coming year is not yet clear. "Right now the industry is in a state of transition in terms of product life cycle," offered Frederic G. Withington, a vice-president at Arthur D. Little, Inc.

Those companies that have healthy shipments of popular products and have significant new products on stream should weather an economic downturn well, he noted. However, many companies are nearing the peak of the life cycle of popular products and have not made significant new announcements.

Other activities include:

- Nixdorf Computer Corp. recently laid off 12% of its work force or about 250 employees because of a slowdown in sales.
- Centronics Data Computer Corp. reduced its work force 32% in the last year, trimming the number of employees from about 3,000 to 2,000.
- Intel Corp. created its 125% solution plan whereby most professional or marketing staff will work 50 hours a week for 40 hours' pay. .
- Sperry Univac has trimmed some 1,200 employees in the past three months, according to H. Glen Haney, vice-president of strategic planning and development. About half of those terminations were accomplished through an early retirement program. However, positions in production, sales, systems or customer engineering vacated by early retirees will be refilled, Haney noted, adding that the purpose of the Sperry Univac cutbacks was to trim overhead-type positions.
- Xerox Corp. recently announced plans to streamline its Office Products Division as part of a nationwide reorganization program. Some 10% of that division's 3,600 employees will or have been terminated.
- Magnuson Computer Systems, Inc. laid off 10% of its employees.

# *Gilroy Vote Favors High Tech*

GILROY, Calif. — A measure that would ban the industrial use of land by a high-technology firm located south of here has been rejected by the voters of Gilroy, paving the way for one or more large computer firms to set up plants in the region.

Rejecting the antitechnology measure by a total of 2,703 votes to 1,282, the Gilroy voters gave considerable cause for embarrassment to Advanced Micro Devices, Inc. (AMD), which earlier in the year gave up rights to the land after initial opposition from environmentalists.

AMD was known to favor the Gilroy location for a new electronics plant because its geographical position was thought to be "resistant to microseismic excitation."

However, when some local residents became excited, AMD promptly withdrew its plan to build the facility.

Owners of the site say now that the political furor is over they are looking in earnest for a new buyer.

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# Database: Cullinane

## *Univac Initiates Transfer Procedures For Mini Manufacturing Facilities*

BLUE BELL, Pa. — Sperry Univac has begun the process of transferring its minicomputer manufacturing facilities from Irvine, Calif., to the firm's existing General Systems Division in Salt Lake City, Utah.

"Minicomputer manufacturing lends itself very well to the type of high-volume, low-cost manufacturing environment offered in Salt Lake City where terminals and communications system products have been made," Neil Gorchow, vice-president and general manager of minicomputer operations, noted.

The move will allow the firm to evenly disperse its overhead expenses and make maximum use of its production personnel, according to Univac.

The shift will involve the reduction of personnel in the 500-person facility. Those employees who have no interest in transferring to the new facility will receive assistance in securing new employment, the vendor said. The relocation will not affect research and development projects or the OEM marketing effort at the California location.

Recently the company transferred its V77 sales force to the firm's Americas Division mainframe marketing branches [CW, Dec. 7].

## STC/Magnuson Merger Planned

LOUISVILLE, Colo. — Storage Technology Corp. (STC) has agreed in principle to acquire Magnuson Computer Systems, Inc. at the exchange rate of about $13.21 for each outstanding share of Magnuson, which would make the deal worth some $65 million.

By acquiring Magnuson, STC gains an entry in the low- to mid-range IBM-compatible systems market. Although known primarily for its IBM-compatible peripherals line, STC in the past couple of years has taken steps toward becoming a full-line supplier of computer systems.

Last year the company formed a research and development limited partnership, after having cut off negotiations for a merger with Amdahl Corp. The new partnership is developing high-end IBM-compatible mainframe systems, with the first model expected to be in the range of four to seven millions of instructions per second.

Certain major shareholders of Magnuson, including officers and directors, have agreed to support the merger. Moreover, Schlumberger Ltd., which holds about 22% of Magnuson stock, has agreed to support the acquisition.

STC has been a major customer of Magnuson for the past two years. The firm uses the Magnuson processor in its Virtual Storage System.

Although Magnuson went public during the summer of 1980 with much hoopla from the financial community, in recent months the firm has come up against some rough financial sailing. In the second and third quarters of this year it posted losses of $2.2 million and $1.5 million, respectively. And in November the company laid off 10% of its 600 workers. Magnuson has blamed those losses on manufacturing problems.

## C. Itoh Subsidiary to Market U.S.-Designed Business System

LOS ANGELES — Through an investment of $7 million, C. Itoh Electronics, Inc. has formed a new subsidiary — CIE Systems, Inc. — which will market a U.S.-designed and Japanese-manufactured small-business system scheduled for introduction during the first quarter of next year.

This will be the first computer system marketed by C. Itoh — part of the $50 billion trading company C. Itoh & Co. Ltd of Tokyo, which has assets of $16 billion. Until now, the firm has been a supplier of computer peripherals and electronic components.

The firm has announced plans to become a supplier of complete office automation systems. Although no details on the upcoming first business computer were revealed, C. Itoh said it will feature an applications program development facility.

Jay L. Kear was named executive vice-president and general manager of the newly formed subsidiary.

## Correction

United Telecommunications, Inc. announced recently [CW, Oct. 26] the election of G. Jack Lorenz as executive vice-president of corporate planning and the appointment of Donald S. Bates as president of the United Telecom Computer Group.

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CW 12/21

## *Broadening Horizons*

# Software Firm Offers Educational Service

**By Robert Batt**
CW West Coast Bureau

SUNNYVALE, Calif. — User education is a buzz phrase much in use right now as management information systems (MIS) departments strive to generate greater productivity in a time of recession.

One software company that got on the educational merry-go-round a year ago was Boole & Babbage, Inc., which set up an Education Services Division that does not peddle its own products, but focuses much more on methodology than on the tools themselves.

"We decided we should do something about education. The types of courses currently available in the industry do not change the way people behave. They go to the courses, come back to their work and carry on in the same old way," David Vincent, general manager of the division, said.

### Broadening Horizons

The aim of the Boole & Babbage courses is to allow the systems programmer and the technological people in a data center to lift their sights above their narrow job horizons to encompass more of the broader business picture, Vincent said.

"There is no way a systems programmer can avoid being in the business he is in. It is no longer acceptable to act as if the MIS department was separate from the rest of the company. The programmer has to know the business he is in and the business reasons for doing what he is doing."

Vincent argued that one of the problems in not having a greater perspective was that communication with end users was minimal.

Indeed, many people, he said, were in their DP jobs to avoid interacting with people. The result, frequently, is that even the problems cannot be defined. For example, if the MIS department has a service level agreement with the end users, problems are known since they are at variance with that agreement.

Yet, Vincent said, fewer than 20% of DP people who attend his courses have such contracts with their user departments.

The Education Services Division puts on four main courses: a capacity management forum for MIS managers and senior executives, a capacity planning and modeling workshop designed for more technical personnel and MVS and IMS systems management workshops designed to be complementary.

The courses range in price from $500 to $800 and are led by practitioners in the field, either from Boole & Babbage or from other organizations. Courses typically consist of 12 to 15 people.

### Industry Receptive

"We know we have hit a responsive chord in the industry," Vincent said. "Even IBM is now attending the capacity management forum and altogether 50% of the attendees are not Boole & Babbage customers."

Vincent argued that the DP professional was experiencing an increasing degree of frustration in his job. "People are task-oriented, but they don't know what to do and then when they do something they don't get a sense of accomplishment. They are looking for some direction."

As a result, Vincent continued, there was a demand by DP people to be educated in the methodology of capacity management tools. "People are up to their necks in tools. They have lots of measures, but they don't know what to do with them."

Problems dealt with in the courses include, for example, understanding the methodology modelings, how to validate the model, what data is required and what input is needed. For instance, in work load forecasts the course is designed to increase the accuracy of projections.

But changing one's behavior patterns is not easy if the Boole & Babbage experience is anything to go by.

Vincent said course students frequently get frustrated when they discover they are going to have to deal more with nontechnical people who do not speak their language. The majority see it as a need to change gradually over time and Boole & Babbage admits that, as a result, it is difficult to monitor results at this stage.

### Recruiting Students

Nevertheless, demand for courses appears to be growing. One systems programmer working in local government in Seattle was not able to get funds to attend the Boole & Babbage class in California. She promptly recruited 16 of her colleagues and invited Boole & Babbage to give the course in Seattle. It is scheduled for February.

Boole & Babbage said that due to initial development costs, it will be another year before the Education Services Division, set up as an independent revenue generator, shows a profit. But it expects the courses to become a major source of income in the years ahead, despite competition from other companies such as IBM and Amdahl Corp.

Furthermore, the company claimed, the educational process will enable it to deal with future technologies before they arrive on the marketplace, thus giving the company valuable insights into its own future product developments.

# Motorola Expanding

*(Continued from Page 53)*

calls for Four-Phase's 9⅛% debentures to remain outstanding and to be converted to Motorola stock. The agreement in principle also allows Motorola to buy up to one million Four-Phase common shares for $45 per share.

For the first three quarters of fiscal 1981, Four-Phase reported $168 million in revenues and $5.3 million or 95 cents per share. Earnings were up 36% from last year's comparable reporting period.

By comparison, a significant softening in the semiconductor market caused Motorola's earnings to fall 3% to $133.3 million or $4.24 per share from 1980's comparable period. Revenues increased 8% to $2.48 billion for the first three quarters.

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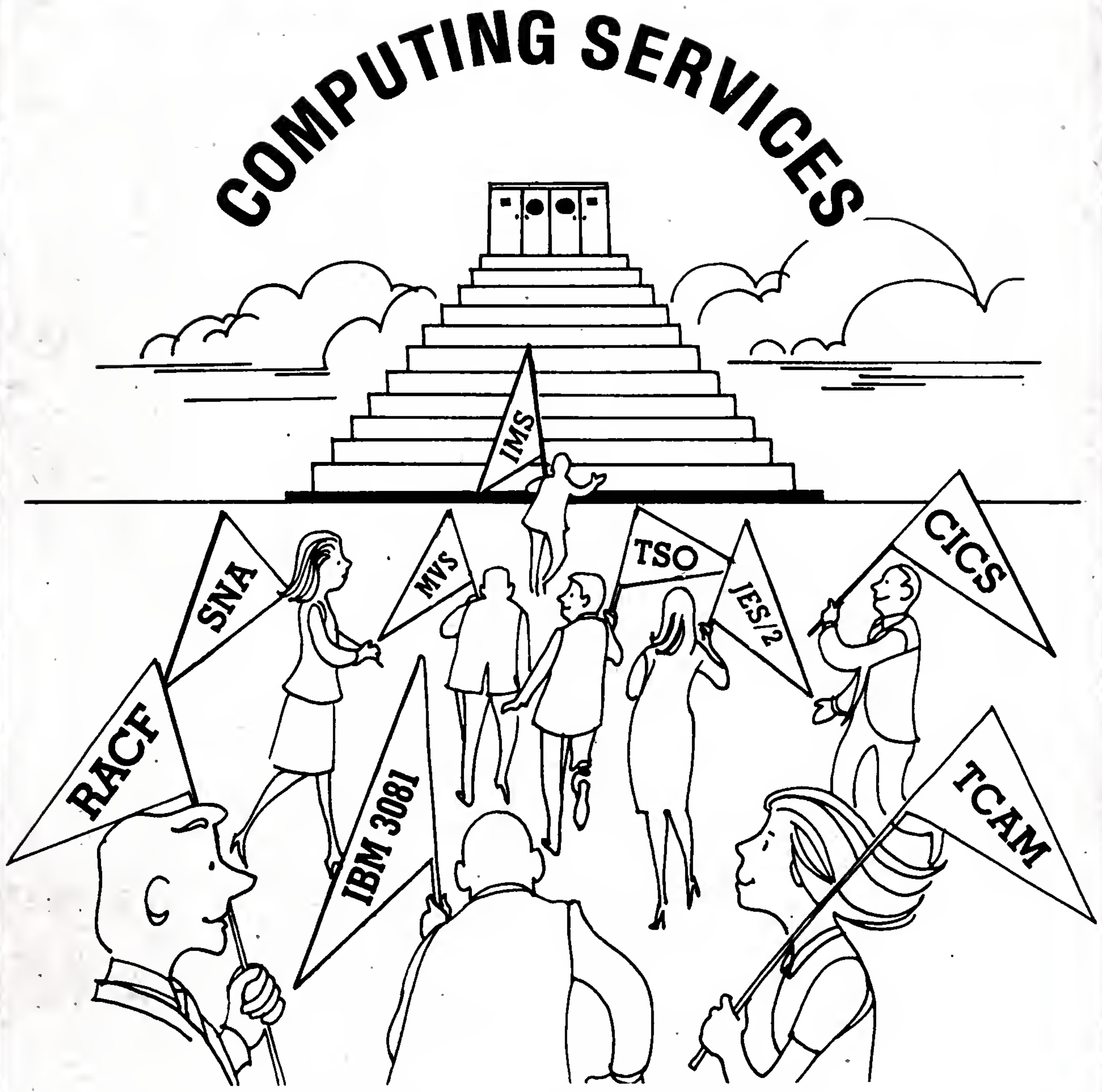

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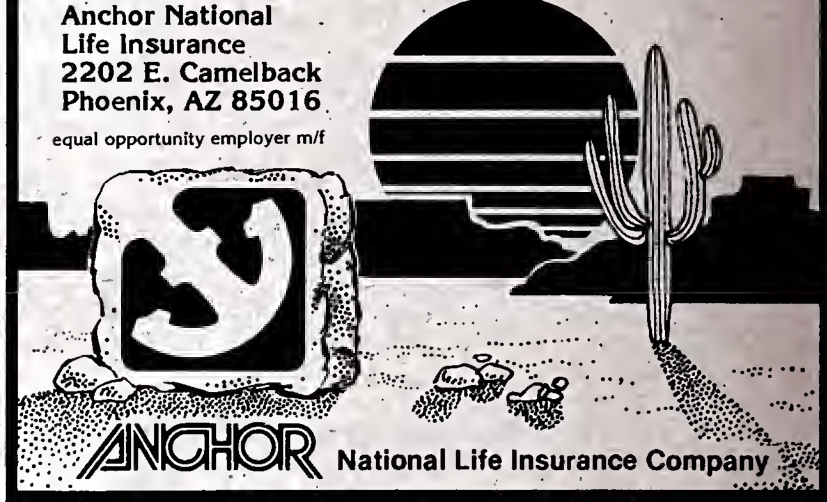

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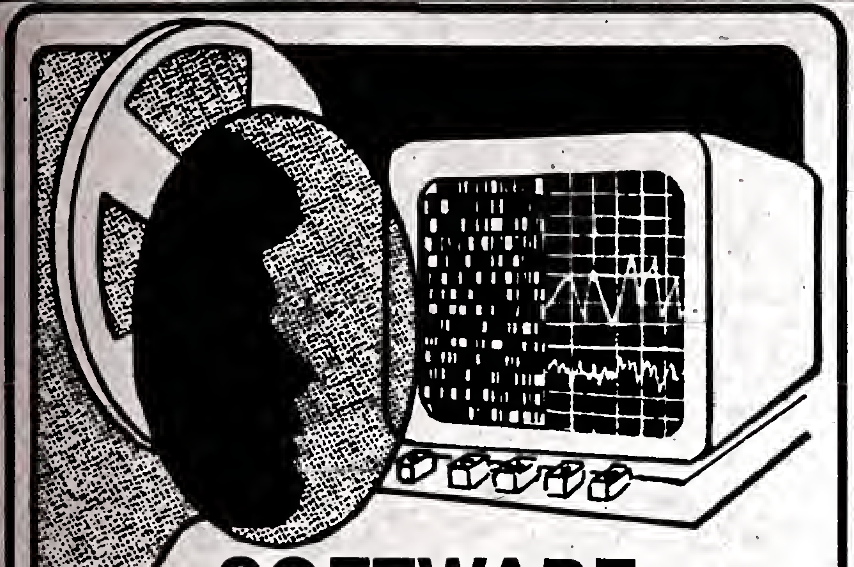

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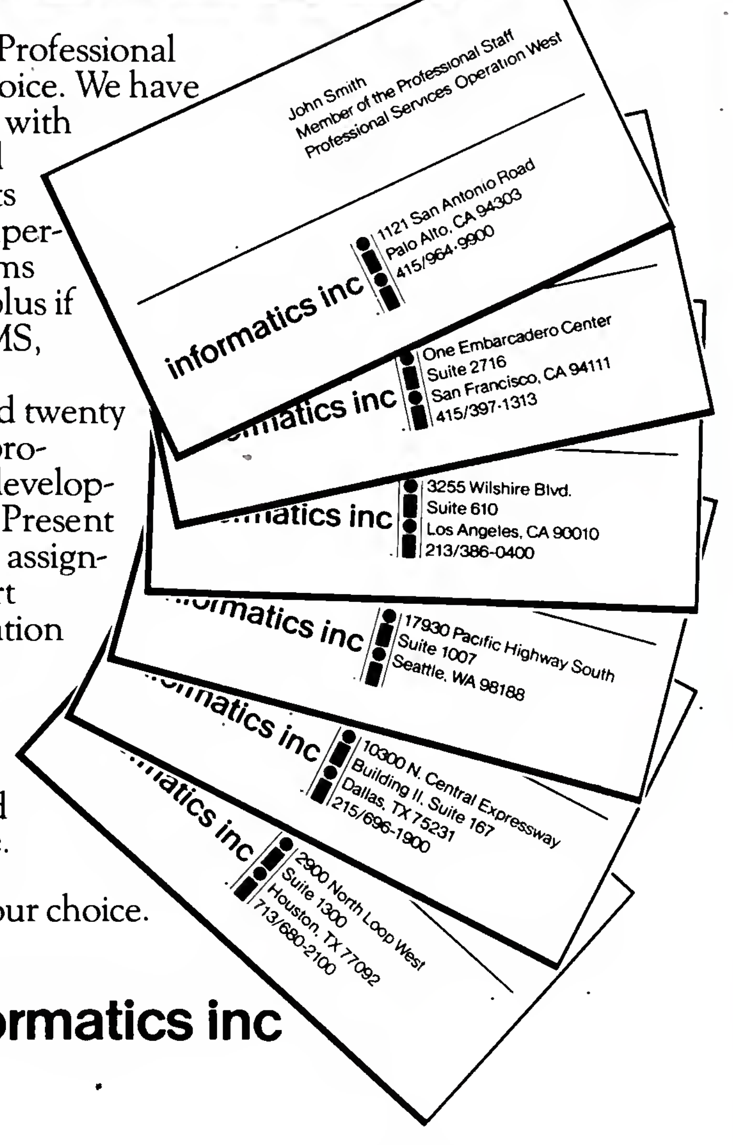

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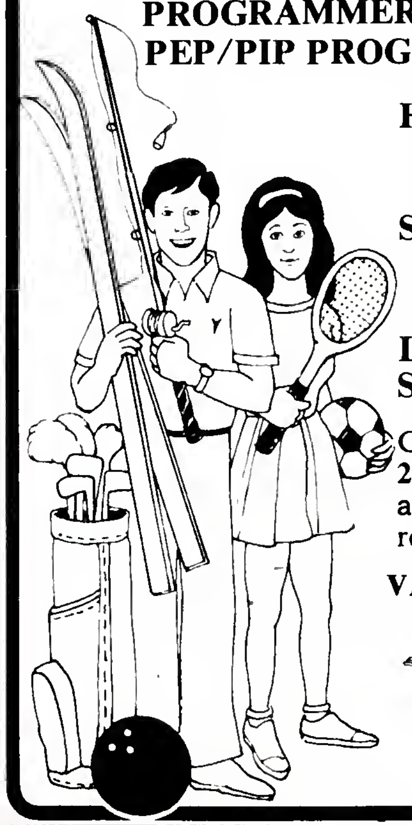

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# Computer Engineers

Now is the time to discover the special benefits of a career with us. We're Arizona Public Service Company, headquartered in Phoenix, Arizona.

We are currently involved in the construction and staffing of the 3 unit Palo Verde Nuclear Generating Station, located 50 miles west of Phoenix. We have immediate openings for Computer Engineers. Successful candidates must have DEC/RSX 11 and/or HW/MOD 400 software experience.

At Arizona Public Service Company you will be able to combine excellent benefits, salary, and career potential with a dynamic Arizona lifestyle.

If you are interested in a challenging opportunity with us, please submit a resume including salary history to:

Steve Harnden
**ARIZONA PUBLIC SERVICE COMPANY**
P.O. Box 21666, Station 8000
Dept. CW 1221
Phoenix, Arizona 85036

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**Arizona Public Service Company**

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## Master of Science Computer & Information Science

If you're interested in advancing your career in computing, you should consider Dartmouth's professional program in the design and management of complex information systems.

Our two-year program is designed to equip tomorrow's information systems managers to lead the design and development of effective business solutions to business problems.

Students in Dartmouth's CIS Program spend one term as interns in a variety of sponsoring organizations. On-campus, they study the broad fundamentals of computer and information science, networks, and distributed processing; design methodologies for reliable, usable, and flexible information systems; communication and management skills crucial to the effective planning, installation, and use of these systems; and the social, ethical, and organizational issues related to information systems.

If you have previous experience in the computing field but want to be equipped to assume more responsibility and leadership in the field, consider joining us next year. For more information, write:

Program in Computer & Information Science
Nathan Smith Building
Hanover, NH 03755

**Dartmouth College**

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# Programmer/Analyst

## MICROCOMPUTERS
## VIENNA, AUSTRIA

A multi-billion dollar international company has a major commitment in the microcomputer field and requires a competent programmer analyst for this unique opportunity. German language not required.

The professional sought will have a minimum of 2 years experience in the microcomputer field including software development and a working knowledge of several compilers such as BASIC, PASCAL and COBOL.In addition, a high degree of understanding of operating systems such as CP/M and/or UCSD, P-systems is necessary. A knowledge of development tools and utilities as well as hardware characteristics of microcomputers is important. A knowledge of Z80, 8080, and 8086 processors Is beneficial.

The successful candidate will be responsible for: evaluation and selection of existing software packages for implementation; specification of programs to be developed by software houses and support and control of same; providing input to manual writers for documentation of packages; executing and/or organizing Beta tests; assuring quality and timeliness of software package availability.

Please send resume with salary history to, **CW-A3149, Computerworld, Box 880, Framingham, MA 01701**

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**Fees and relocation expenses company paid.**

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## COMPUTER TECHNOLOGY TEACHING POSITION

Vincennes University, a comprehensive community Junior College located in Southern Indiana has a nine-month faculty position in Computer Technology available beginning January 8, 1982. Qualifications include a minimum of Bachelors Degree in Computer Science, Business (with emphasis on computer courses), or related studies in the programming field or equivalent. Teaching experience in programming aptitude desired. Candidates with occupational experience, post secondary education and teaching experience will be considered.

Salary commensurate with education and qualifications. Position offers the opportunity to work with the latest in IBM equipment, IBM 4341 and IBM 4331, group II.

**Qualified applicants should submit a resume, transcript, statement of qualifications, and letter of recommendation to: Gerald Smith, Chairman, Business Division, Vincennes University, Dincennes, IN 47591. (812) 885-4285 or Jim Horn, Department Chairman (818) 943-3179.**

Applications accepted until December 29, 1981. Due to time constraints, interviews will commence immediately.

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| Prog | Lite CICS | $24K |
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| Prog | COBOL or NEAT 3 | $20K |
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(504) 524-3773

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# DATA PROCESSING OPERATIONS MANAGER

WALT DISNEY WORLD CO. has immediate opening for a Data Processing Operations Manager. Individuals will be responsible for the planning and management of Computer Operations, Data Entry, and Data Control Departments.

Qualified candidates will possess a Bachelor's Degree with 6-8 years computer operations management experience in a UNIVAC 1100/medium size operation. Good oral and written communication skills are also necessary.

Please send resume with salary requirements to:

**WALT DISNEY WORLD CO.**
**Professional Staffing CW-1**
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**Lake Buena Vista, FL 32830**

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Pan Am is the prime contractor for the U.S. Air Force at the Arnold Engineering Development Center, the largest aerospace testing facility in the free world.

Competent professionals are needed to fill positions as:

## SYSTEMS ANALYSTS

B.S. degree in MIS or related field required. Ability to communicate effectively with data processing personnel, users and management. Must have extensive experience as an analyst in a business data processing organization.

For Consideration, Please Send Resume
and Salary Requirements to:

J.K. Bell, Employment Supervisor
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Mission Support Services Project
Arnold Air Force Station, TN. 37389

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# Director of Data Processing
## *Tampa Bay Area*

Live and work In the greater Tampa Bay Area for one of the 5 largest construction companies In Florida. We are a technical leader In our use of computers in the construction Industry nationwide.

The successful candidate must currently head a D.P. Department, have at least 10 years experience In the D.P. environment and possess a Business Degree. A Masters Degree in Computer Science and prior construction company exposure would be extremely helpful. Your experience with System Design and Programming; different Hardware, Software and Operating Systems; and Budget and Personnel Administration will also be helpful.

If you qualify and are looking for a position of responsibility with a dynamic company on the grow, send your resumé along with salary history to:

**Director of Data Processing**
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## *TEXAS & THE SUNBELT*

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*Examples of some of their current, immediate needs are:*

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**Immediate opening for a data processing professional who wants to work in a state of the art environment. Requires 4+ years experience on a large frame IBM, O/MVS, IMS and COBOL.**

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**Take charge individual to head a programming effort for "Fortune" 500 company. Requires 3+ yrs. experience, IBM 370/158, 370/168, OS/MVS, OCL and COBOL.**

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**Excellent growth opportunity for experienced programmer analyst capable of being promoted to manager in near future. Requires 4+ yrs. in large frame IBM, DOS/VS or DOS/VSE under VM, online CICS, nationwide communications experience a plus.**

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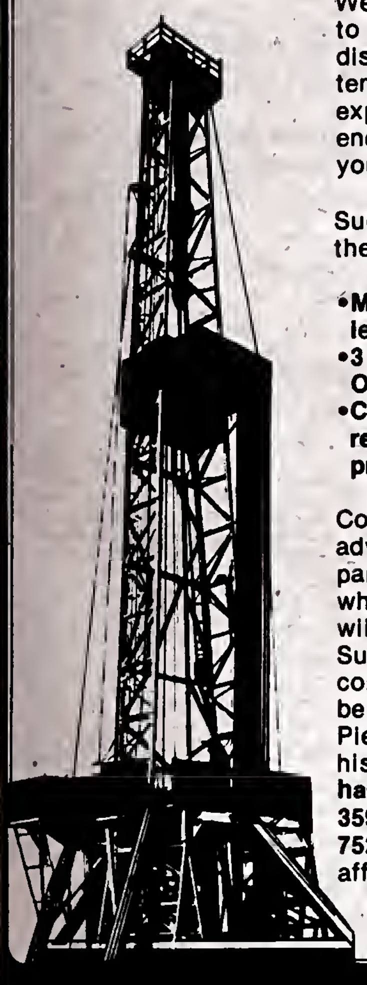
**f-o-r-t-u-n-e**

## CICS PROGRAMMERS

Continental Emsco is a Dallas based manufacturer, distributor and supplier of oilfield equipment supporting the energy industry worldwide. The growth of Continental Emsco is demonstrated by our installation of two IBM 4341/Group II mainframes, coupled with a CICS for on-line applications development.



We have key opportunities for people to develop new on-line financial and distribution applications for our system. Now is the time to build on your experience base in the strong, vital energy industry, while you advance your career.

Successful candidates should have the following qualifications:

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- **3 or more years experience in an OS/VS and/or MVS environment.**
- **COBOL and knowledge of OS, JCL is required. IMS data base design in preferred.**

Continental Emsco offers you all the advantages of a billion dollar company with a half-century of success where your individual contributions will be recognized and rewarded. Successful candidates will receive competitive salaries and excellent benefits including profit sharing. Please send your resume with salary history in confidence to: **C.C. Neidhart, Continental Emsco, P.O. Box 359, Dept. CW1221, Dallas, Texas 75221.** We are an equal opportunity/affirmative action employer, m/f.

"Be Our Energy Partner"

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# DATA PROCESSING MANAGER

Expanding data processing department in a 150-bed medical center seeks experienced Manager/Programmer to direct computer operations. New Sperry Univac System 80 recently installed. Expanded on-line capacity to be operational within 60 days. Candidates must be familiar with RPG II. Some experience with COBOL also helpful. Candidates must possess a progressive management and supervisory background. Ideal coastal Maine location along with a competitive salary and benefits makes this a very attractive opportunity. Apply in confidence, submitting resume and salary history to:

**Thomas A. Bosica, Jr.**
**Personnel Services Director**

**PENOBSCOT BAY MEDICAL CENTER**

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**04841**

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## Technical Programmer

Eastman Whipstock, an energy related oil service company, located in Houston, Texas, has an immediate need for a Programmer with experience in design, code, test and document Fortran applications programs (heavy math and some graphics) for RSX systems. Some DECnet work.

If interested to schedule an interview, contact Stephen E. Pitt, Employment Manager, at our toll free number 1-800-231-6844 or our local number 713-741-2200.

We offer a comprehensive benefits package and a competitive salary.

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# DIRECTOR, MANAGEMENT INFORMATION SYSTEMS

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Initial activities will center around determination of user needs and the finalization of hardware and software to accomplish objectives. Subsequent activities will involve implementation of systems, establishing operating procedures and maintenance of a rapidly expanding distributed processing operation.

**Qualified candidates must:**

- **Have a BS in Computer Science, Accounting or related field (graduate degree preferred).**
- **Have 8-10 years in data processing including:**
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  - **systems development and maintenance**
  - **data communications**
  - **on-line systems**
  - **hardware operations**
  - **management experience in an MIS department**

The successful candidate will be results-oriented with good written and communicative skills, have the creativity and desire to keep Nimslo at the state-of-the-art in MIS, consistant with our objectives.

In addition to an attractive life style in Atlanta, Nimslo offers the kind of challenges which only could exist in an innovative, high technology company. If a stimulating, progressive environment as well as excellent salary and benefits package thoroughly commensurate with your responsibilities and expertise are what you're looking for, get in touch. Send your resume, including salary history and requirement, in complete confidence to:

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Attention: MIS
One Nimslo Park, Atlanta, GA 30338

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# SYSTEMS PROGRAMMERS DATA BASE ADMINISTRATOR

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## CANON's

**rapidly expanding Corporate EDP Department**

Innovative products and aggressive marketing strategies have swept Canon into the front rank of dynamic international corporations. Our Corporate Data Processing Department is right at the center of the action – growing in size and importance every day as it takes an increasingly vital role in every aspect of business planning and operations.

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**Experienced with DOS/VSE, CICS or IDMS-DC**

## DATA BASE ADMINISTRATOR

**Experienced with IDMS**

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# DALLAS

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**Tom Rung**
**Mike Denison**
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DATA PROCESSING CAREERS inc

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## Software Marketing Specialist

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We are seeking a marketing specialist with proven experience in software sales/marketing to head up the marketing of our new products. A working knowledge of IBM operating systems, DBMS systems and systems environments is necessary. Opportunities exist for international travel and the successful applicant will assist in developing and implementing software marketing strategies for both the U.S. and foreign markets. This position presents a unique opportunity to develop and manage a new software marketing staff for international market penetration.

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**(518) 783-1161**

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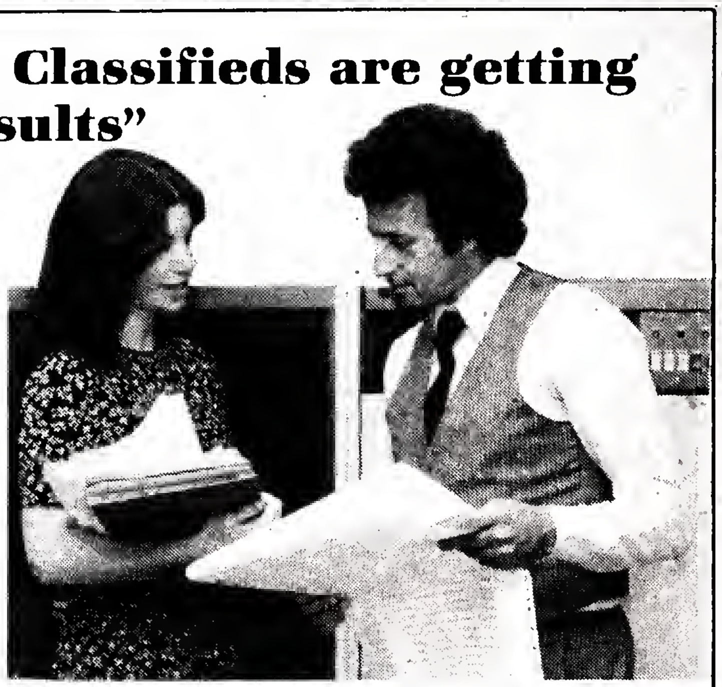

## How to reach qualified DP Professionals.

Take advantage of *Infoworld's* nationwide circulation to reach the computer professionals you need now. *InfoWorld* is a weekly newspaper directed to the microcomputing, personal-computer market. Readership surveys indicate that 80% of *InfoWorld* readers work professionally with all types of computer systems and software.

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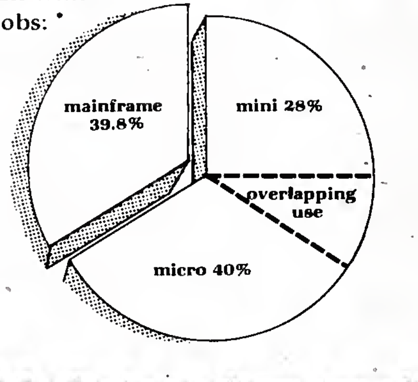

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## D.P. PROFESSIONALS

### DL1 DOS/VSE VM CMS

We are looking for you to become part of a highly-competent team in a manufacturing firm...

- Enjoying rapid and steady growth
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- With at least a 4-year program of major new project development
- And top management's complete support of Data Processing.

**DATA BASE ADMINISTRATOR** who has worked with IMS or DL1 will develop data dictionary, establish procedures to manage data resources, and control the test environment for DB systems. An opportunity for a professional who has good IMS experience to step up to the DBA function.

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## SYSTEMS SOFTWARE SPECIALIST

Growth and expansion of our nationally recognized, midwest based corporation has created the need for a professional in Technical Support. Responsibilities include software evaluation, installation, and maintenance. Additional areas of emphasis include data communications, hardware evaluation, systems standards and security. Requirements are 3-5 years of systems support experience in Honeywell Level 66 System software components. We offer a salary commensurate with experience and excellent fringe benefits with vacation in 1982.

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# DALLAS

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### PROGRAMMER ANALYST

Continuing strong demand for data processing personnel has created the need for programmers with at least two yrs. COBOL and CICS programming experience. Have several positions available. TO: $35,000.

### SYSTEM 32, 34

Have an immediate need for programmer with RPG II programming experience on an IMB System 34. Manufacturing experience highly desired. TO: $26,00.

**CONTACT: John Staiger**
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## 300 DP OPENINGS

(ALL Fee Paid)

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| Prog/Anal (2 yrs RPG II, SYS 34) | 18-25K |
| Prog/Anal (2 yrs DEC PDP 11) | 25-31K |
| Prog/Anal (2 yrs COBOL, UNI 1100) | 20-25K |
| Prog Anal (2 yrs IMS or CICS) | 25-39K |
| Sys Anal (3 yrs COBOL, IBM 370) | 23-36K |
| Sr Sys Anal (5 yrs CPCS) | 32K |
| DP Mgr (5 yrs IBM 370 or SYS 34) | 30-35K |
| Sys Engr (3 yrs IBM 370, IMS/DB) | 25-35K |
| Hdwe/Sftwe Engr (3 yrs Z80, 8080) | 25-40K |
| Sys Prog (3 yrs ASSEM or COBOL) | 24-30K |
| Sys Prog (2 yrs IBM 370, OS) | 20-25K |
| Sr Sys Prog (5 yrs. IBM 370 OS) | 30K |
| IMS/DB Analyst (3 yrs IMS/DB) | 25-35K |

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## BUSINESS ADMINISTRATION/DATA PROCESSING

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On February 1, 1982, or July 1, 1982 CCC will have an opening for a Chairperson of the Business and Technology Division. Responsibilities include: supervision and evaulation of personnel, leadership in course and program development, preparation of divisional goals, objectives, budget, and teaching of courses in data processing. A twelve month position. Rank in salary competitive and commensurate with eduation and experience.

Masters degree required. MBA preferred minimum of 10 years experience in Business, Industrial experience preferred; training and experience in data processing required.

**Application letter and vita must be postmarked by January 15, 1982. Apply to the Dean of Instruction, Cumberland County College, P.O. Box 517, Vineland, NJ 08360.**

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## MANAGER OF DATA PROCESSING

Work in an environment where your efforts can be directly related to ministering to others and spreading the Gospel. Join hundreds of Christians who are working to direct and support the aid and evangelism of programs in 85 countries around the world.

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Primary applications revolve around our donor and child sponsored systems that support several fund raising offices in Europe. Send resume to:

**John Spencer**
**Director of Human Resources**
**World Vision International**
**919 W. Huntington Drive**
**Monrovia, CA 91016**

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## SYSTEMS PROGRAMMER II

The fastest growing telephone system in the United States is seeking a qualified individual to fill the position of Systems Programmer II. Requirements include: a minimum of four years on a large scale system and three years systems programming experience using Assembler and COBOL in an IBM 3033 OS environment. A working knowledge of MVS, TSO, CICS, IMSVS, DB/DC, ACF/VTAM and MSNF experience is a definite plus. The applicant selected need not be surprised to receive individualized recognition for their contribution towards the achievement of departmental goals. Above average preformance is rewarded by unlimited growth opportunities. The location of employment is in Bristol, Tennessee. Start 26K - 30K. Current competitive salary and excellent benefits with our company. We're excited about the potential future challenges in the Telecommunications industry, are you? If you feel you talents measure up to a career oportunity with United Telecommunications, Inc., reply with your resume in strict confidence to:

**C. Rasberry**
**Personnel Administrator**
**UNITED TELECOM**
**United Telecommunications, Inc.**
**P.O. Box 11315**
**Kansas City, MO 64112**
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## Manager Technical Services Senior Systems Programmer

Exception opportunity with N.Y.S.E. Insurance company must have minimum two years systems programmer experience on OS/VS1 or MVS operating systems. CICS experience a must ACF/VTAM, SNA, ACF/NCP a plus. Please send full resume and salary requrirements to:

**Reply to CW-A3142**
**Computerworld**
**Box 880**
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## SYSTEMS ANALYST

Design and implement computer systems related to business applications. Maintenance and enhancement of these systems, and provide vital skills which ensure their successful and cost effective operation. B.S. in Computer Science. 2 years experience or 2 years related experience as Consultant. Must have knowledge of COBOL. $25,000 per year to work 40 hours/5 days/week. Please send resume: **MBS Inc., 161 West 75th Street, New York, N.Y. 10023.**

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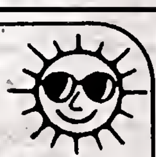

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Advance your career in the location of your choice!

If you have a minimum of 1 year of experience, call collect (or send resume) to: **Ann Barker**

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## NCR Equipment

**NCR Director of Data Processing**

State of the art environment

Requirements:
Total, VRX, COBOL, On-Line Programming experience

Send resume and salary history to:

**Vice President of MIS**
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## DIBALL 11 PROGRAMMER

Programmer/Analyst to support large base of Digital Equipment Corp. computers nation wide. Required to design full systems and communicate with users. Some travel. Up-state New York living, an exciting growth company.

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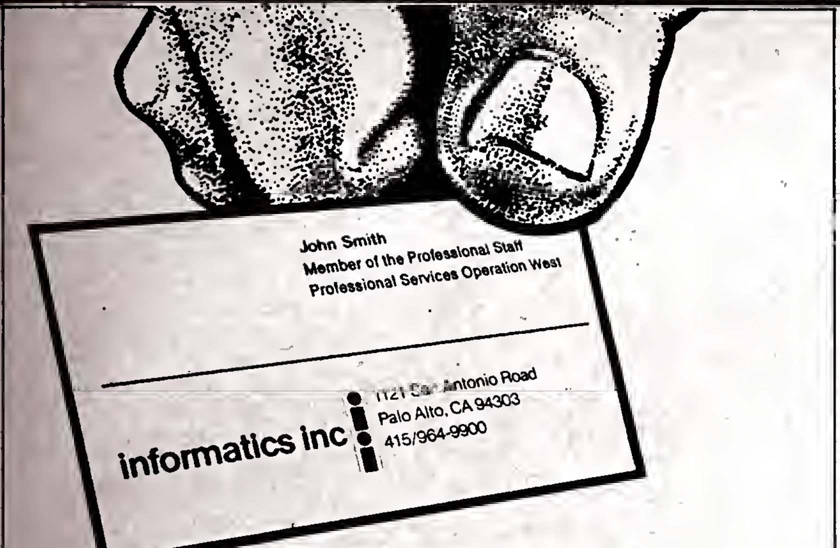

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Are you qualified to become a Member of the Informatics Professional Staff? If you're a top performer in large IBM/OS environments with a strong background in MARK IV® applications, you're definitely going in the right direction.

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## FOR

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**Environments:** On-line TP and ADP Systems using large scale UNIVAC Computers and CSTS Operating System with various communication devices and multilingual terminals Arabic and English.

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**2223 West Loop South, Suite 410**
**Houston, Texas 77027**
**or**
**Dr. Abdulaziz N. I-Sagr (Box 128)**
**Dept. of Systems Eng. & Computer Science**
**University of Petroleum & Minerals**
**Dhahran, Saudi Arabia**

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## DATA PROCESSING OPPORTUNITIES

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The HOMESTAKE MINING CO., a leader in the exploration and mining of precious metals, presently has 3 M.I.S. career opportunities located in its Denver based regional office. These openings (Technical Support Supervisor, Sr. Programmer Analyst, and Programmer Analyst) will involve various levels of responsibilites in our corporate M.I.S. function. Qualified candidate must possess 2-4 years software business programming experience (COBOL) on DEC 2040 or 2060, proficiency in data communications, excellent communications skills and be a self-starter. We offer excellent salary and comprehensive benefits and relocation package.

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Annual salary (superannuable) is: HK$112,980 x 7,620 - 128,220 BAR 135,840 x 7,620 - 173,940 - 181,500 - 189,060 (LI = HK$10.70 approx.). Starting salary will depend on qualifications and experience.

At current rates, salaries tax will not exceed 15% of gross income. Housing benefits at a rental of 7½% of salary, education allowance, leave and medical benefits are provided.

Further particulars and application forms may be obtained from the **Association of Commonwealth Universities (Appts.), 36 Gordon Square, London WCIH OPF, or from the Apppointments Unit, Secretary's Office, University of Hong Kong, Hong Kong.**

**The closing date for applications is January 31, 1982.**

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If you are a professional who likes working on advanced, complex computer systems, then you should join our data processing center. We are utilizing an IBM 370 and installing an IBM 4341 in January. Our major on-line systems utilize CICS, DOS-VS, and DOS-VSE. Programming is on-line with ADR's Librarian and Vollie. COBOL is our major language, FORTRAN is used for Engineering and DYL280 for report generation. We are looking for:

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**Programmer Analysts** - one to assist and work into systems programming; one for Fortran and several for general applications in Cobol.

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**Burbank, CA 91502**
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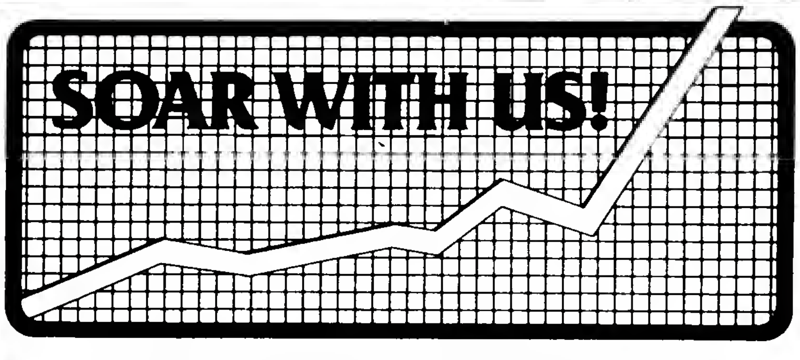
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Send resume to or call:

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**Orem, Utah 84057**
**Phone (801) 224-6400**
**Attention: Howard Olpin**

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Please send detailed resume to:

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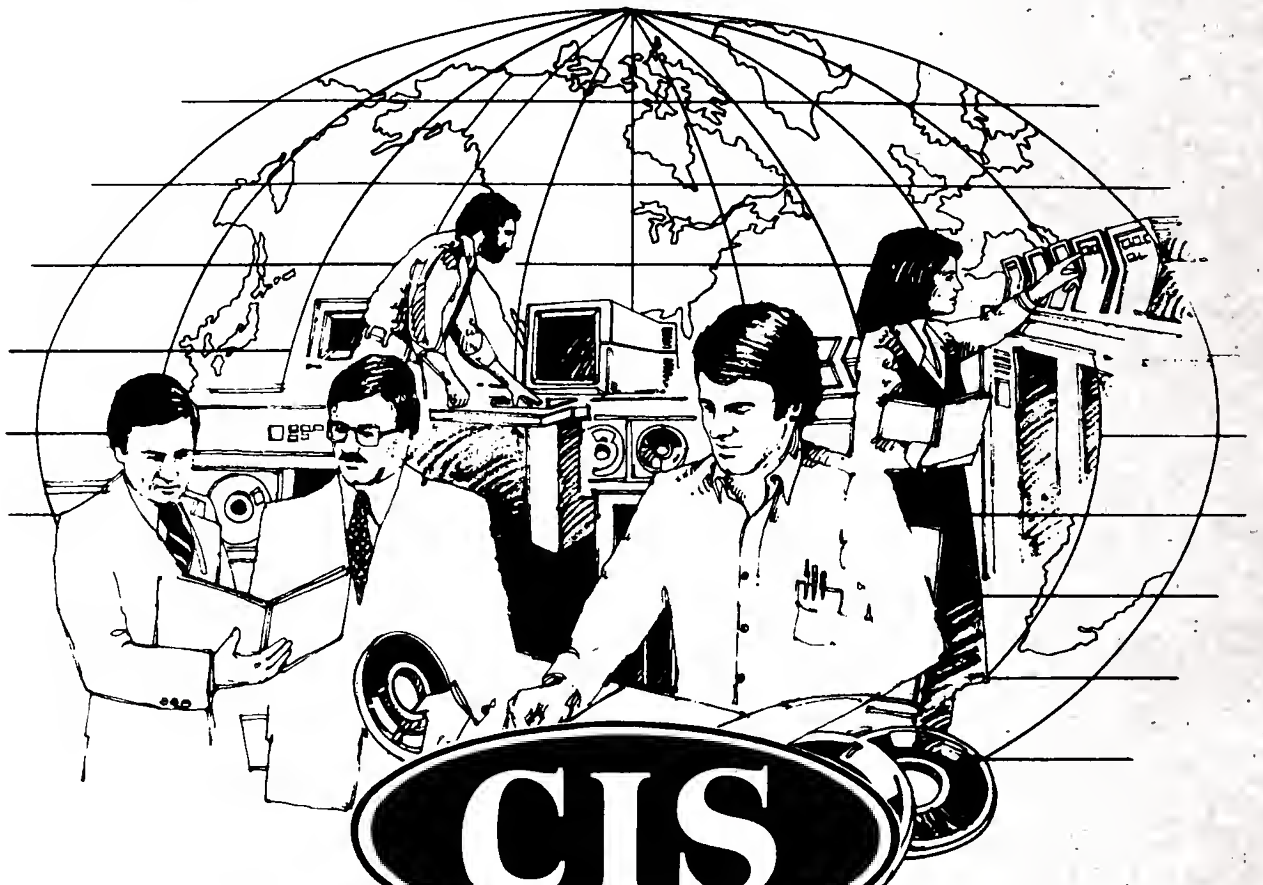

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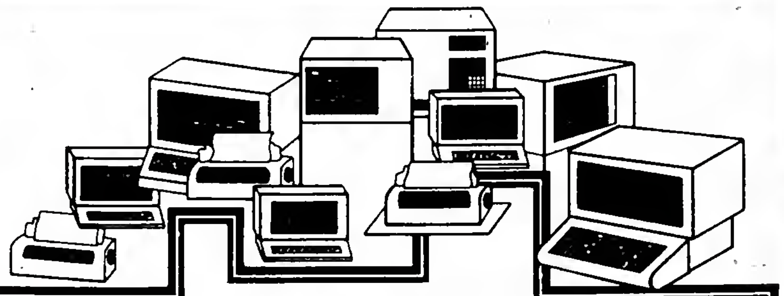

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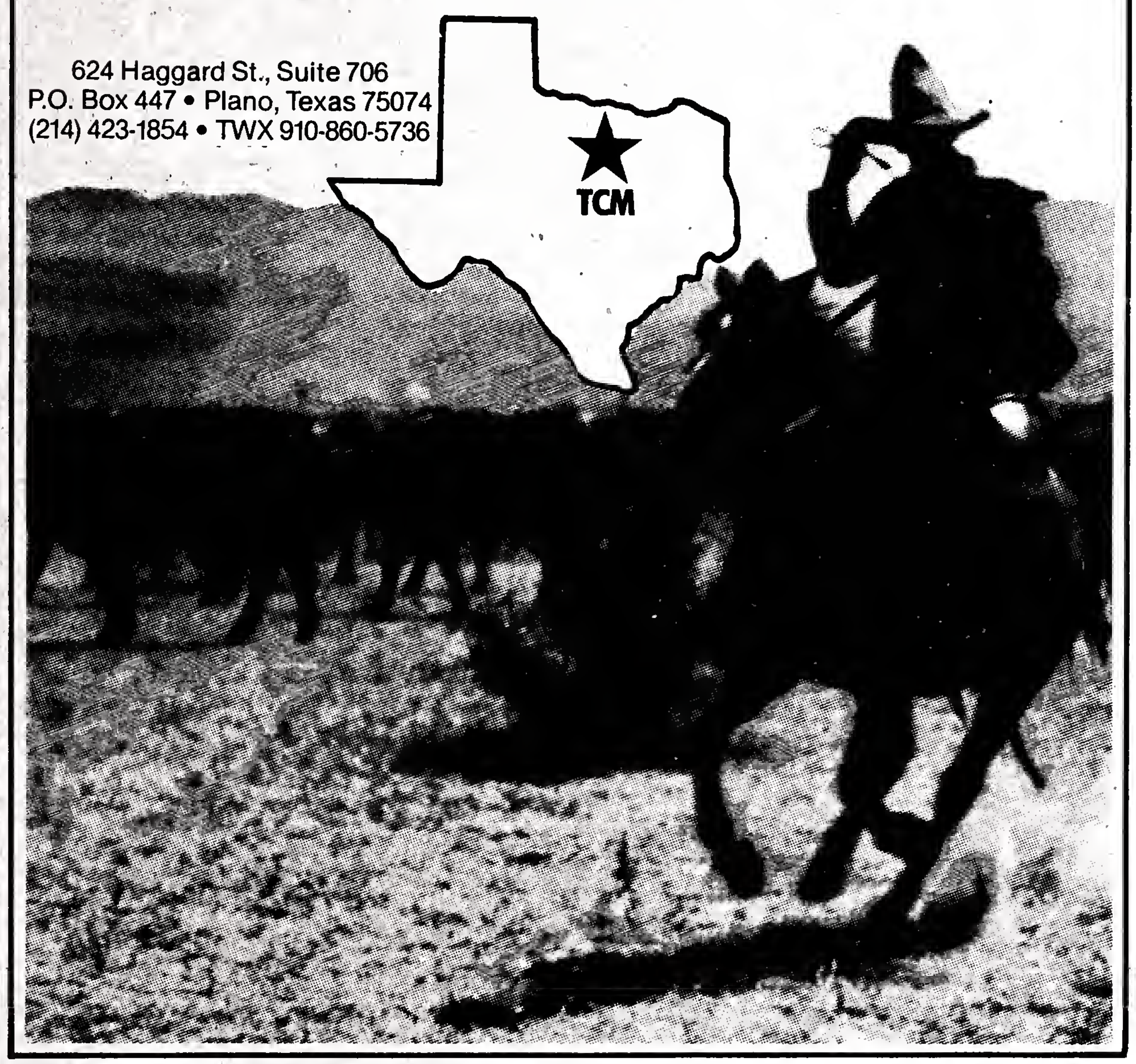

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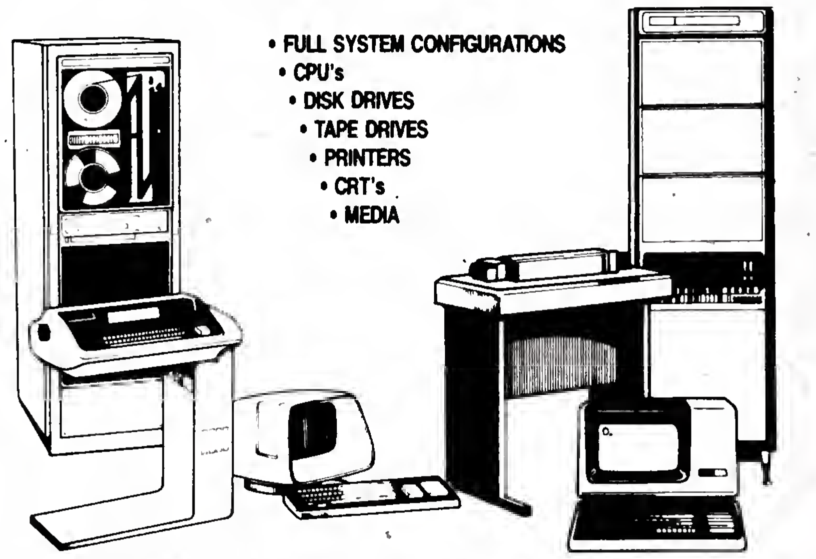

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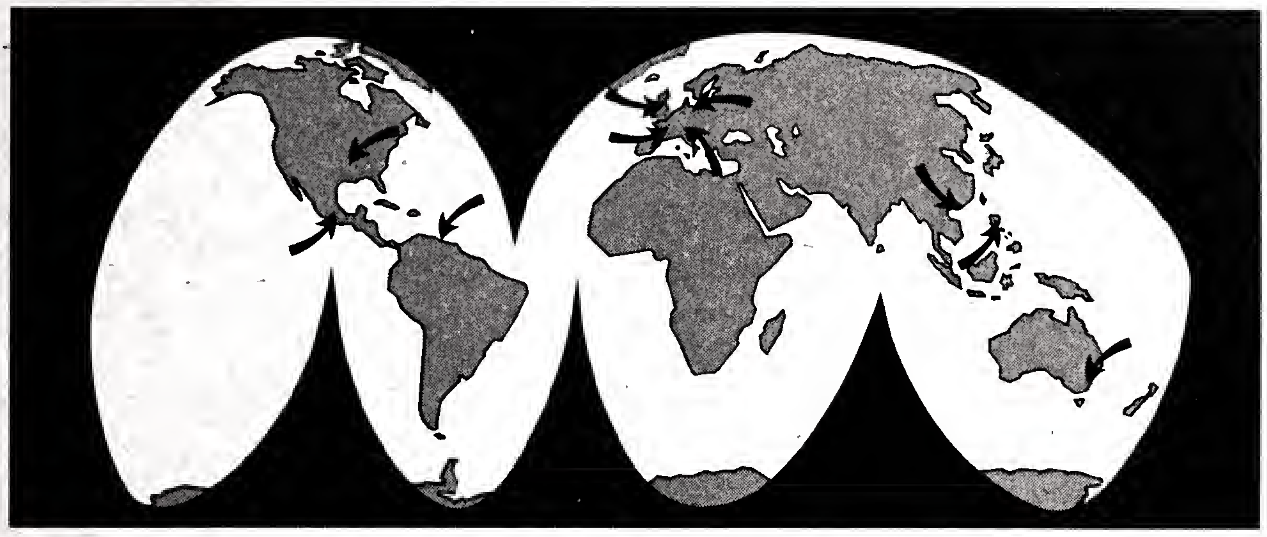

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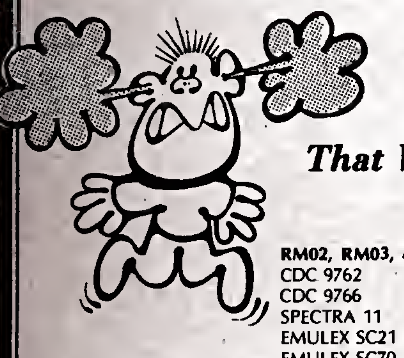

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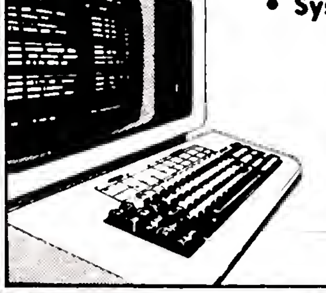

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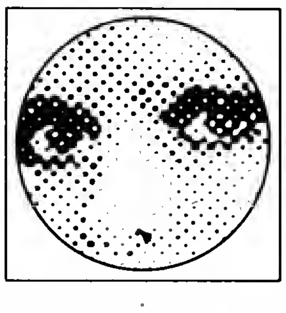

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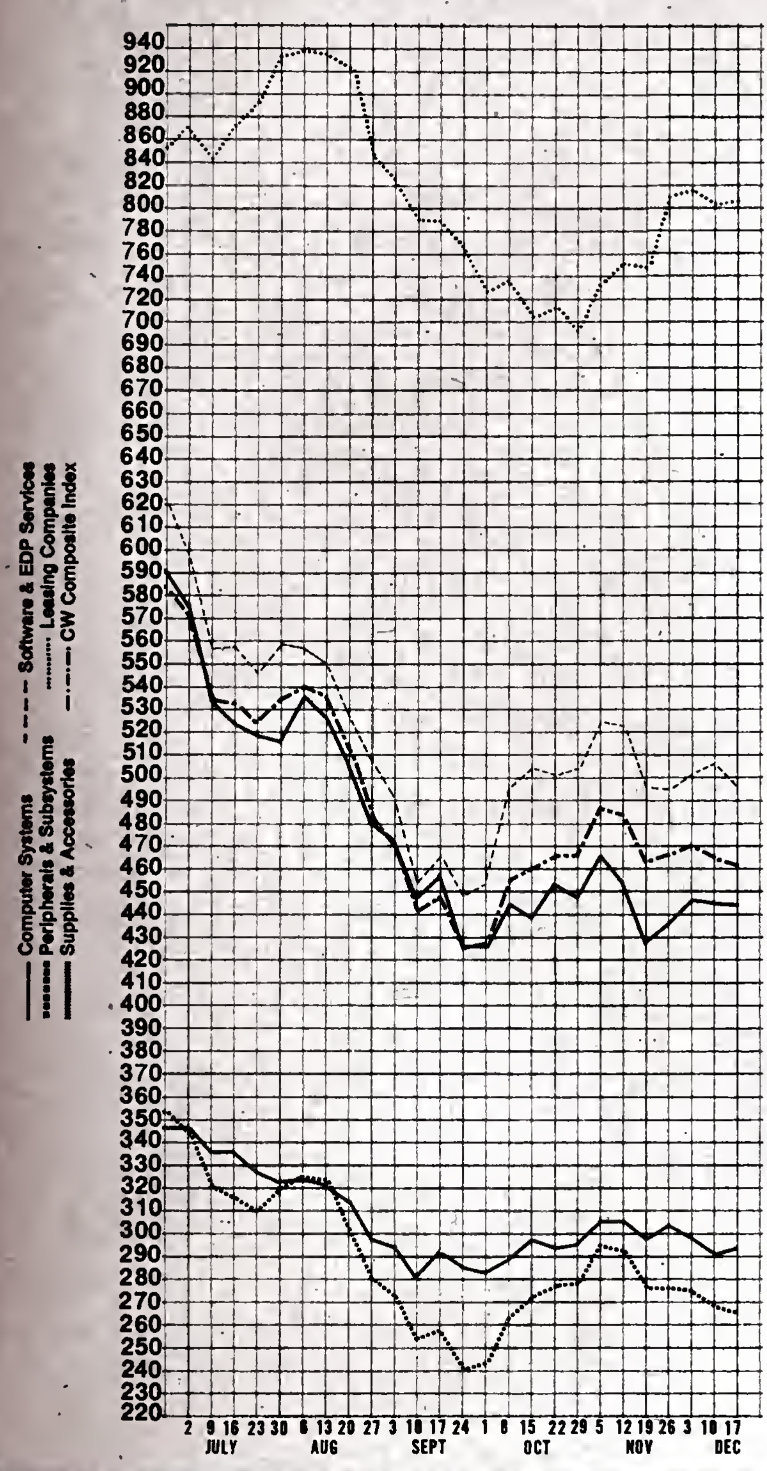

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# Computerworld Stock Trading Summary

CLOSING PRICES WEDNESDAY, DECEMBER 16, 1981

All statistics compiled, computed and formatted by
TRADE QUOTES, INC.
Cambridge, Mass. 02139

### COMPUTER SYSTEMS

| EXCH | | PRICE 1980-81 RANGE (1) | CLOSE DEC 16 1981 | WEEK NET CHNGE | WEEK PCT CHNGE |
|---|---|---|---|---|---|
| A | AMDAHL CORP | 23- 46 | 27 3/8 | - 1/2 | -1.7 |
| N | BURROUGHS CORP | 28- 72 | 34 3/8 | + 1/4 | +0.7 |
| O | COMPUTER AUTOMATION | 9- 28 | 10 1/2 | - 1/4 | -2.3 |
| N | CONTROL DATA CORP | 19- 42 | 36 5/8 | -1 7/8 | -4.8 |
| N | CRAY RESEARCH INC | 28- 49 | 38 1/8 | + 1/4 | +0.6 |
| N | DATA GENERAL CORP | 42- 87 | 55 5/8 | -1 1/8 | -1.9 |
| N | DATAPOINT CORP | 40- 68 | 47 1/2 | -1 1/8 | -2.3 |
| N | DIGITAL EQUIPMENT | 80-113 | 86 3/4 | -1 3/4 | -1.9 |
| A | EECO INC | 7- 19 | 7 3/8 | - 3/8 | -4.8 |
| N | ELECTRONIC ASSOC. | 5- 13 | 5 1/2 | + 1/8 | +2.3 |
| N | FOUR-PHASE SYSTEMS | 18- 46 | 38 | +5 1/8 | +15.5 |
| N | FOXBORO | 42- 62 | 50 1/8 | -2 5/8 | -4.9 |
| O | FULCRUM COMP GRP | 1- 3 | 3/8 | 0 | 0.0 |
| O | GENERAL AUTOMATION | 6- 16 | 6 1/8 | + 1/4 | +4.2 |
| N | HARRIS CORP | 39- 60 | 39 1/8 | - 1/2 | -1.2 |
| N | HEWLETT-PACKARD CO | 33- 54 | 40 | - 3/8 | -0.9 |
| N | HONEYWELL INC | 70-115 | 70 1/2 | - 3/8 | -0.5 |
| N | IBM | 49- 73 | 54 1/8 | + 1/4 | +0.4 |
| O | MAGNUSON COMP SYSTS | 10- 32 | 11 5/8 | + 5/8 | +5.8 |
| N | MANAGEMENT ASSIST | 11- 26 | 11 | - 1/2 | -4.3 |
| O | MINI-COMPUTER SYST | 1- 4 | 7/8 | - 1/8 | -12.5 |
| N | MODULAR COMPUTER SYS | 7- 32 | 8 1/4 | - 1/4 | -2.9 |
| N | MOHAWK DATA SCI | 11- 32 | 15 1/2 | + 3/4 | +5.0 |
| N | NCR | 39- 76 | 41 1/4 | - 5/8 | -1.4 |
| N | PRIME COMPUTER INC | 18- 49 | 23 1/2 | +1 | +4.4 |
| N | PERKIN-ELMER | 21- 36 | 27 1/4 | + 7/8 | +3.3 |
| N | SPERRY CORP | 30- 65 | 34 5/8 | - 3/4 | -2.1 |
| O | TANDEM COMPUTERS INC | 13- 35 | 27 3/4 | + 1/2 | +1.8 |
| N | TEXAS INSTRUMENTS | 75-151 | 78 1/4 | -2 | -2.4 |
| A | WANG LABS. | 23- 46 | 26 1/2 | - 1/2 | -1.8 |

### LEASING COMPANIES

| EXCH | | PRICE 1980-81 RANGE (1) | CLOSE DEC 16 1981 | WEEK NET CHNGE | WEEK PCT CHNGE |
|---|---|---|---|---|---|
| O | BOOTHE FINANCIAL CP | 18- 29 | 23 | 0 | 0.0 |
| N | COMDISCO INC | 16- 25 | 24 | - 1/8 | -0.5 |
| O | COMMERCE GROUP CORP | 1- 2 | 1 1/8 | + 1/4 | +28.5 |
| O | COMPUTER INVSTRS GRP | 1- 4 | 1/4 | 0 | 0.0 |
| O | CONTINENTAL INFO SYS | 4- 9 | 5 | - 1/2 | -9.0 |
| A | DCL INC | 3- 4 | 3 5/8 | 0 | 0.0 |
| N | DPF INC | 5- 13 | 11 1/8 | - 1/4 | -2.1 |
| O | ITEL | 1- 15 | 3/4 | - 1/8 | -14.2 |
| O | LEASPAC CORP | 1- 2 | 1/8 | 0 | 0.0 |
| N | RELIANCE GROUP INC | 65-100 | 97 | 0 | 0.0 |
| N | U.S. LEASING | 18- 30 | 24 3/8 | 0 | 0.0 |

EXCH: N=NEW YORK; A=AMERICAN; P=PHIL-BALT-WASH
L=NATIONAL; M=MIDWEST; O=OVER-THE-COUNTER
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### SOFTWARE & EDP SERVICES

| EXCH | | PRICE 1980-81 RANGE (1) | CLOSE DEC 16 1981 | WEEK NET CHNGE | WEEK PCT CHNGE |
|---|---|---|---|---|---|
| O | ADVANCED COMP TECH | 2- 6 | 2 1/2 | 0 | 0.0 |
| O | ADVANCED SYSTEMS INC | 10- 15 | 14 | 0 | 0.0 |
| O | ANACOMP INC | 11- 19 | 12 1/8 | - 3/4 | -5.8 |
| O | ANALYSTS INTL CORP | 3- 14 | 7 1/4 | + 1/4 | +3.5 |
| A | APPLIED DATA RES. | 13- 25 | 20 3/8 | -1 | -4.6 |
| N | AUTOMATIC DATA PROC | 22- 32 | 26 1/4 | -1 5/8 | -5.8 |
| O | CGA COMPUTER ASSOC | 4- 25 | 5 1/2 | - 1/2 | -8.3 |
| O | COMPUTER HORIZONS | 1- 5 | 3 | 0 | 0.0 |
| O | COMPUTER NETWORK | 4- 9 | 4 1/2 | + 1/4 | +5.8 |
| N | COMPUTER SCIENCES | 12- 30 | 12 1/2 | + 3/8 | +3.0 |
| O | COMPUTER TASK GROUP | 13- 23 | 12 3/4 | -1 | -7.2 |
| O | COMPUTER USAGE | 2- 10 | 3 | + 1/4 | +9.0 |
| O | COMSERV CORP | 9- 16 | 15 | - 3/4 | -4.7 |
| O | COMSHARE | 7- 21 | 7 1/2 | 0 | 0.0 |
| O | CULLINANE DATABASE | 15- 37 | 33 1/2 | -1 3/4 | -4.9 |
| O | DATA DIMENSIONS INC | 0- 4 | 1/8 | 0 | 0.0 |
| O | DATATAB | 1- 4 | 1 7/8 | + 3/8 | +25.0 |
| O | DSI CORP | 4- 9 | 5 3/8 | - 3/8 | -6.5 |
| O | DYATRON CORP | 3- 11 | 3 1/2 | 0 | 0.0 |
| N | ELECTRONIC DATA SYST | 15- 30 | 24 1/4 | - 1/8 | -0.5 |
| O | INFORMATICS INC | 17- 34 | 27 1/4 | - 1/4 | -0.9 |
| O | INSYTE CORP | 1- 3 | 2 | 0 | 0.0 |
| O | IPS COMPUTER MARKET. | 1- 4 | 1 | - 1/4 | -20.0 |
| O | KEANE ASSOCIATES | 4- 8 | 4 3/4 | 0 | 0.0 |
| A | LOGICON | 23- 38 | 31 1/8 | + 3/8 | +1.2 |
| O | MNGT SCI AMER INC | 17- 26 | 23 | - 3/4 | -3.1 |
| O | MATHEMATICA INC | 12- 24 | 21 1/2 | -1 | -4.4 |
| O | MATHEMATICAL APP GRP | 15- 28 | 17 1/2 | -1 | -5.4 |
| O | NATIONAL DATA CORP | 14- 28 | 19 3/4 | -1 1/8 | -5.3 |
| N | PLANNING RESEARCH | 5- 13 | 5 3/4 | - 1/2 | -8.0 |
| O | PROGRAMMING & SYS | 1- 2 | 1 1/8 | + | +5.8 |
| O | RAPIDATA INC | 5- 16 | 15 3/8 | - 5/8 | -3.9 |
| O | REYNOLDS & REYNOLD | 16- 26 | 20 1/2 | - 1/4 | -1.2 |
| O | SEI CORP | 17- 28 | 23 1/4 | -1 1/2 | -6.0 |
| O | STSC INC | 7- 28 | 7 1/2 | - 1/2 | -6.2 |
| O | SCIENTIFIC COMPUTERS | 8- 16 | 9 | - 3/8 | -4.0 |
| O | SOFTWARE AG | 11- 23 | 14 | -1 1/4 | -8.1 |
| N | TYMSHARE INC | 23- 58 | 26 1/2 | - 3/8 | -1.3 |
| A | URS CORP | 11- 18 | 13 3/8 | 0 | 0.0 |
| N | WYLY CORP | 7- 20 | 8 | - 1/4 | -3.0 |

### PERIPHERALS & SUBSYSTEMS

| EXCH | | PRICE 1980-81 RANGE (1) | CLOSE DEC 16 1981 | WEEK NET CHNGE | WEEK PCT CHNGE |
|---|---|---|---|---|---|
| N | AM INTERNATIONAL | 4- 25 | 4 | + 1/4 | +6.6 |
| A | ANDERSON JACOBSON | 10- 26 | 12 3/4 | + 1/2 | +4.0 |
| O | AUTO-TROL TECHNOLOGY | 10- 62 | 10 1/4 | - 1/4 | -2.3 |
| O | BANCTEC INC | 20- 35 | 31 1/2 | -1 3/4 | -5.2 |
| O | BEEHIVE INT'L | 6- 18 | 8 1/2 | +1 1/8 | +15.2 |
| A | BOLT,BERANEK & NEW | 9- 25 | 10 | + 1/8 | +1.2 |
| O | CAMBEX CORP | 2- 9 | 2 3/4 | - 3/8 | -12.0 |
| N | CENTRONICS DATA COMP | 7- 40 | 11 1/4 | + 1/8 | +1.1 |
| A | CETEC CORP | 4- 9 | 4 1/8 | 0 | 0.0 |
| O | COMPUTER DEVICES INC | 4- 10 | 7 1/2 | - 1/2 | [illegible] |
| O | COGNITRONICS | 3- 11 | [illegible] | [illegible] | [illegible] |
| O | COMPUTER COMMUN. | 1- 8 | [illegible] | [illegible] | [illegible] |
| A | COMPUTER CONSOLES | [illegible] | [illegible] | [illegible] | [illegible] |
| O | COMPUTER TRANSCEIVER | 3- 9 | 5 1/4 | -1 1/4 | -19,2 |
| N | COMPUTERVISION CORP | 20- 49 | 29 5/8 | - 5/8 | -2.0 |
| N | CONRAC CORP | 17- 28 | 24 1/4 | +1 7/8 | +8.3 |
| A | DATA ACCESS SYSTEMS | 5- 23 | 6 1/4 | + 1/2 | +8.6 |
| A | DATAPRODUCTS CORP | 19- 44 | 21 3/4 | - 5/8 | -2.7 |
| O | DATUM INC | 2- 5 | 1 3/4 | 0 | 0.0 |
| O | DAVID JAMISON CARLYL | 3- 6 | 5 7/8 | +1 3/8 | +30.5 |
| O | DECISION DATA COMPUT | 3- 6 | 2 3/4 | + 1/8 | +4.7 |
| O | DELTA DATA SYSTEMS | 2- 4 | 2 3/8 | + 1/8 | +5.5 |
| O | DATARAM CORP | 4- 15 | 7 7/8 | + 5/8 | +8.6 |
| N | ELECTRONIC M & M | 3- 9 | 3 1/4 | - 3/8 | -10.3 |
| O | EVANS & SUTHERLAND | 18- 40 | 33 | -1 1/2 | -4.3 |
| O | FABRI-TEK | 2- 6 | 3 1/2 | 0 | 0.0 |
| O | GENERAL COMPUTER SYS | 1- 12 | 7 1/4 | +1 1/4 | +20.8 |
| N | GEN'L DATA COMM IND | 8- 19 | 8 1/4 | - 3/8 | -4.3 |
| O | GENERAL TERMINAL CP | 1- 4 | 7/8 | 0 | 0.0 |
| N | HAZELTINE CORP | 19- 35 | 26 1/8 | + 3/8 | +1.4 |
| O | INFORMATION INTL INC | 8- 17 | 10 1/4 | - 3/4 | -6.8 |
| O | INTEL CORP | 23- 51 | 24 1/2 | - 1/4 | -1.0 |
| O | IPL SYSTEMS INC | 6- 15 | 6 1/2 | -1 | -13.3 |
| A | LUNDY ELECTRONICS | 7- 18 | 8 3/8 | - 3/4 | -8.2 |
| A | MSI DATA CORP | 11- 27 | 16 1/4 | -1 1/4 | -7.1 |
| O | NETWORK SYSTEMS CORP | 14- 25 | 21 5/8 | - 3/8 | -1.7 |
| O | OMEX | 2- 12 | 8 | 0 | 0.0 |
| N | PARADYNE CORP | 25- 52 | 39 5/8 | - 3/8 | -0.9 |
| A | PENRIL CORP | 9- 17 | 8 7/8 | - 3/4 | -7.7 |
| O | RAMTEK CORP | 9- 23 | 12 1/2 | - 1/8 | -0.9 |
| N | RECOGNITION EQUIP | 6- 21 | 6 3/8 | - 1/4 | -3.7 |
| O | SCAN DATA | 1- 5 | 3/4 | 0 | 0.0 |
| N | STORAGE TECHNOLOGY | 18- 40 | 36 1/4 | -1 3/8 | -3.6 |
| O | SYKES DATATRONICS | 8- 34 | 27 | - 3/4 | -2.7 |
| A | T BAR INC | 12- 19 | 12 1/2 | -1 | -7.4 |
| A | TEC INC | 4- 7 | 5 1/8 | - 1/4 | -4.6 |
| N | TEKTRONIX INC | 46- 70 | 54 | +2 | +3.8 |
| N | TELEX | 5- 9 | 5 7/8 | - 1/4 | -4.0 |
| D | TESDATA SYSTEMS CP | 6- 17 | 7 1/8 | + 1/8 | +1.7 |
| A | TIMEPLEX INC | 8- 19 | 8 7/8 | + 3/8 | +4.4 |
| O | WILTEK INC | 1- 3 | 2 1/4 | - 1/4 | -10.0 |

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| EXCH | | PRICE 1980-81 RANGE (1) | CLOSE DEC 16 1981 | WEEK NET CHNGE | WEEK RCT CHNGE |
|---|---|---|---|---|---|
| N | AMERICAN BUS PRODS | 11- 17 | 12 5/8 | + 1/2 | +4.1 |
| O | BALTIMORE BUS FORMS | 1- 2 | 1/2 | 0 | 0.0 |
| N | BARRY WRIGHT | 15- 24 | 17 7/8 | 0 | 0.0 |
| O | CYBERMATICS INC | 1- 2 | 1 | 0 | 0.0 |
| A | DUPLEX PRODUCTS INC | 12- 17 | 12 1/8 | 0 | 0.0 |
| N | ENNIS BUS. FORMS | 15- 23 | 19 3/4 | - 1/4 | -1.2 |
| N | 3M COMPANY | 48- 65 | 54 1/4 | - 1/4 | -0.4 |
| O | MOORE CORP LTD | 27- 38 | 32 5/8 | - 1/4 | -0.7 |
| N | NASHUA CORP | 17- 33 | 17 3/4 | - 1/8 | -0.6 |
| O | STANDARD REGISTER | 30- 41 | 34 3/4 | + 1/4 | +0.7 |
| A | TAB PRODUCTS CO | 15- 30 | 17 | +2 | +13.3 |
| N | WALLACE BUS FORMS | 22- 36 | 32 3/8 | -1 3/8 | -4.0 |

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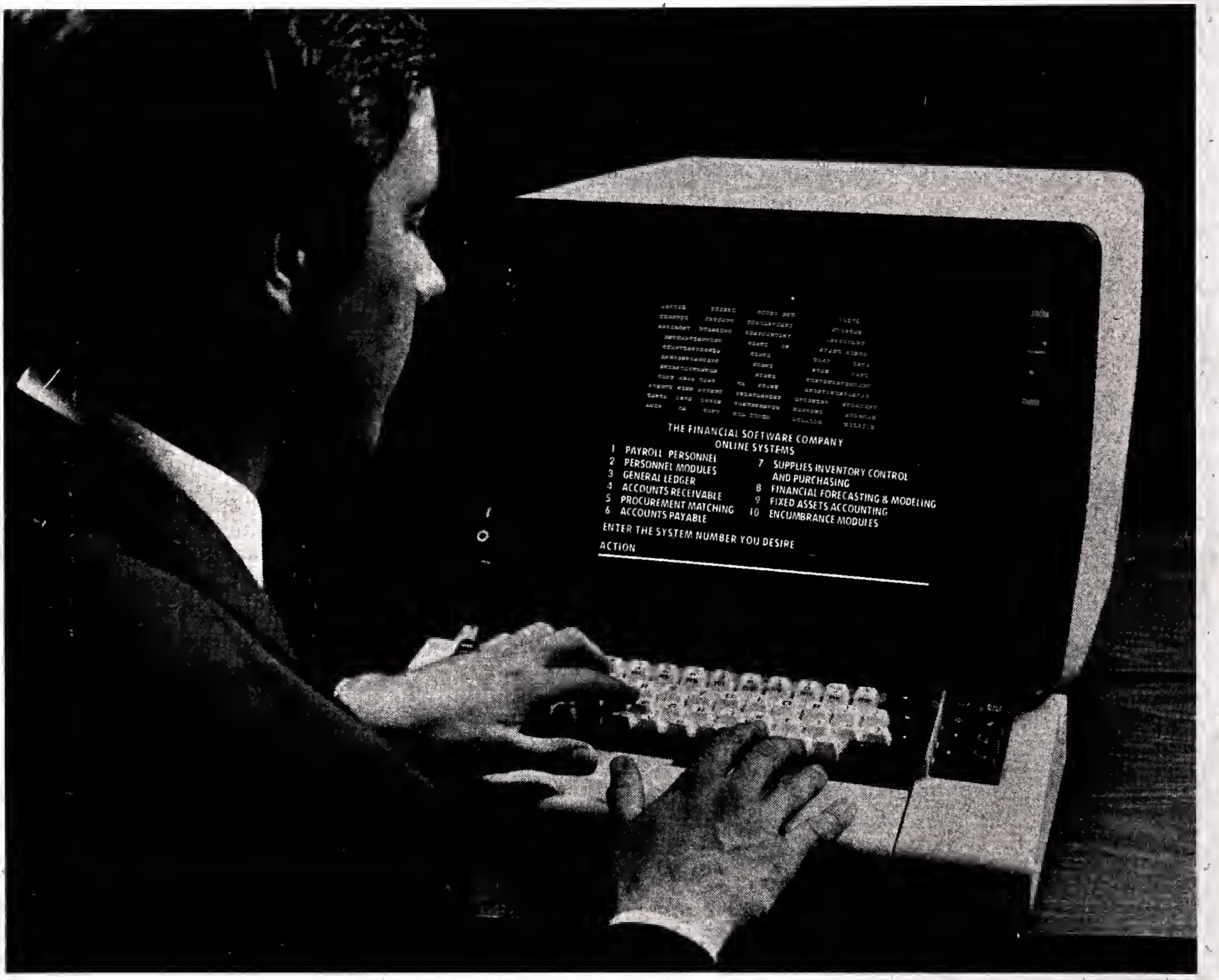

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```

It's 9:00PM. Your accounting staff is still in the office choking down stale sandwiches and trying to put together an important management report for an early morning meeting.

MSA is about to put an end to this scenario. With the new Easy-Audit module of Easy-Screen™ from MSA, you'll be able to format the appropriate screen, have all the information you need, instantly, and in the proper form for presentation.

## MORE OF A GOOD THING

Easy-Audit is a new real-time, online module of Easy-Screen,™ our software innovation that lets you design new screens, modify existing ones, rearrange information and make calculations, without putting a strain on your programmers.

Easy-Audit adds the benefit of speed to the simplicity and flexibility of Easy-Screen. It will produce the fastest, easiest access to financial and management information you've ever had.

## COMING SOON

Easy-Audit will be available with MSA's Accounts Payable and Accounts Receivable Systems in the 4th Quarter of 1981.

It will be available with General Ledger, Fixed Assets and other MSA systems early in 1982.

We wanted to let you know about Easy-Audit now so that we can begin discussing the possible uses of Easy-Screen/Easy-Audit with you.

| YOUR NEXT SOFTWARE SYSTEM IS PROBABLY ON THIS LIST: |
|---|
| 1. General Ledger |
| 2. Financial Information & Control |
| 3. Fixed Assets Accounting |
| 4. Financial Forecasting & Modeling |
| 5. Payroll Accounting |
| 6. Personnel Management & Reporting |
| 7. Accounts Receivable |
| 8. Accounts Payable |
| 9. Supplies Inventory Control & Purchasing |
| 10. Procurement Matching |

## MORE NEW IDEAS

[illegible] the newest

ing edge in the independent software industry.

This year, we plan to spend more than $17 million enhancing and refining our complete line of financial, cash management and human resource systems. That's more than the total revenues of most of our competitors.

While that shows our size, we hope it also demonstrates our commitment to constantly improving our products and our service to you.

Today, MSA offers the most comprehensive list of programs currently available from one source.

It's all we do. And we take our work very seriously.

MSA installation growth has averaged 31% a year for ten years. We have licensed over 6500 software packages for more than half of the Fortune 500 companies and hundreds of smaller firms, many with their first computer.

## WE'VE GOT INFORMATION YOU NEED

Send us this coupon and we'll send you more information on Easy-Screen™ and other MSA systems. Or call and have a talk with Robert Carpenter at (404) 262-2376.

MANAGEMENT SCIENCE AMERICA, INC.
3445 PEACHTREE ROAD, N.E.
ATLANTA, GEORGIA 30326

☐ Please send me more information on Easy-Screen™ and the new Easy-Audit Module.

☐ Please send me information on the free MSA seminars scheduled this fall.

☐ Please send me more information about the following MSA systems: (Write numbers from product list.)

NAME
TITLE
COMPANY
ADDRESS
CITY
STATE ZIP
BUSINESS PHONE ( )
Computer Type/Model:

CW 7A1(12/21/81)

MSA